The RUBBER AGE

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Published Twice-a-Month by

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It is with pleasure and pride in American achievement that we have made the leading feature of this issue a definite report from Harvey S. Firestone, Jr., vice-president of the Firestone Plantations Company. The article outlines in a comprehensive way the progress which has been made to date and the policies which are being pursued by the Firestone interests in their relationship with Liberia and the native laborer.

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Rubber Institute Members Announce Standard Warranty for Tires

First Concrete Step of New Organization on Behalf of Manufacturers Is to Bring Them Into Agreement on Guarantee to be Offered on Tires—Warranty Covers Defects for Full Life of the Tire

AS ITS initial effort toward the establishment of better merchandising practices in the rubber industry, the recently-organized Rubber Institute, Inc., has brought its tire manufacturing members into agreement on a standard warranty on automobile tires. On August 16, by means of a nation-wide advertising campaign, motorists of the country were informed that hereafter the tire manufacturers will make good on any defects in workmanship or materials in their tires at any time during the full life of the tire.

This broad new warranty supersedes the old "ninety-day" warranty adopted some time ago by members of the Rubber Association of America, Inc. Under its provisions defects were made good only if they were discovered within 90 days from the time the tire had its first road wear. This guarantee against defects in workmanship and material was itself adopted as a corrective of the old definite mileage guarantee which had become commonly abused. The new warranty just adopted by the Rubber Institute is thereby trending back in the direction of liberality for the motorist.

Warranty Has Led to Abuses

Under the ninety-day warranty, tire adjustment abuses had been greatly curtailed and the companies were making notable savings in that direction. During the last two years, however, there has been a tendency on the part of mail order houses and certain tire companies to liberalize the terms of their guarantees on tires until the reopening of the entire question became imperative.

The mail order houses in particular made the situation acute. They have not only adhered to the policy of guaranteeing tires sold by them for definite mileages but the mileage guarantee has itself been over-liberal. Guarantees of 25,000 and 30,000 miles on mail order tires are not uncommon. In meeting the mail order competition various manufacturers have been led to adopt various schemes, some embracing tire "insurance" and others practically duplicating mileage guarantees of the mail order houses. It was to clarify what was rapidly becoming a dangerous situation that the Rubber Institute has acted.

There are 44 tire manufacturing members of the Rubber Institute who signed the announcement of the new warranty. Their production is said to be fully 95 per cent of the entire tire output of the United States. Accordingly, no trouble in applying the new guarantee is expected if all the member companies will apply it in their organizations strictly as planned.

Never before has such a widespread publicity campaign been attempted by the rubber industry in putting a new policy into effect. The sum of $415,000 has been appropriated for a nation-wide educational campaign which will include at least three large advertisements in the newspapers of 438 cities, plus full pages in the *Saturday Evening Post*, the *Country Gentleman* and 13 leading farm papers. The magazine advertising will extend from September into December and will also include a group of rubber and automotive trade papers in which double spread announcements will reproduce the revised warranty and one of the newspaper advertisements. The cost of the campaign will be pro-rated among the tire companies on the basis of their domestic tire sales.

A special committee of the Rubber Institute, consisting of sales executives, was appointed to work with Director-General L. C. Andrews, in planning and executing the campaign. Members are L. C. Rockhill, Miller Rubber Company, chairman; L. A. McQueen, B. F. Goodrich Company; R. S. Wilson, Goodyear Tire & Rubber Company; L. R. Jackson, Firestone Tire & Rubber Company; and Harry L. Post, Seiberling Rubber Company.

In addition to sending copies of the announcement to more than 125,000 tire dealers, each dealer was also furnished reprints of the warranty, in size suitable for hanging, as well as large proofs of the three newspaper advertisements. The advertising campaign is being directed by the Erickson Company, New York City, with Justin R. Weddell in charge.

Text of New Guarantee

The new guarantee in effect settles definitely and unequivocally upon the manufacturer all responsibility for possible defects that can be traced to the quality of materials employed or to negligence in manufacture. The text of the pledge to tire buyers is as follows:

"Every pneumatic tire of our manufacture bearing our name and

AKRON P. O. FLOODED BY INSTITUTE MAIL

The post office at Akron was provided with its record individual mailing problem when the Rubber Institute, Inc., sent out its announcements of the revised tire warranty to dealers and newspapers through the country. The post office was given the task of dispatching mail sufficient to fill nine mail cars, according to Postmaster L. D. Carter.

There were 250,000 pieces of mail in the initial release, enough to fill 9,000 mail sacks. Printing of the material that constituted this huge consignment kept 14 presses of an Akron printing concern busy running off more than 1,250,000 sheets. A crew of 75 mailing clerks was kept at work binding and addressing the tubes at the printing plant.

serial number is warranted by us against defects in material and workmanship during the life of the tire to the extent that if any tire fails because of such defect, we will either repair the tire or make a reasonable allowance on the purchase of a new tire."

It is emphasized that this warranty is unlimited as to time or mileage, the responsibility of the factory continuing throughout the entire life of the tire. In case of the failure of the tire due to defect, no matter how far or how long that tire has traveled, fair and equitable adjustment is promised by the manufacturer on the basis of the tire's normal expectancy of service had the defect not appeared. It is the expressed purpose of the warranty to assure the buyer a quality product capable of satisfactory performance.

In commenting upon the announcement of the new guarantee, General Lincoln C. Andrews, director general of the Rubber Institute, expressed his belief that it would make for higher standards and end permanently the unfair practices that once prevailed under the old promises of a stated mileage.

Forms a Basis for All Claims

"The reputable manufacturer," he declared, "always stands behind his quality product to make good any article in which a defect may have developed due to faulty material or workmanship. The purpose of this warranty is to provide for the handling of all claims on a basis of adjustment which will be fair to all consumers. Adjustments will be restricted to defective tires only, and replacements will be based on reasonable expectancy and without any limitations regarding time or mileage. This is a better protection to the individual user than any definite mileage guarantee that can be written.

"In the days when roads were rough, when manufacturers were learning how to make automobiles, when tire manufacturers were learning how to make tires, and when drivers were learning to drive, even a short motor trip was a sporting event, and the life of a tire was a gamble. In those days it was reasonable enough to guarantee a certain mileage for an uncertain tire.

"But the years have brought good roads, skilled drivers, and the present high standard of cars and tires. The tire industry has gone to great pains and expense not only to produce a dependable product but to educate the public in its proper use and care, and the good driver today gets more for his money than ever before. Moreover (it is uneconomic to guarantee the service of any tire in terms of time or miles when one has no control over the conduct of the driver who uses it. Road conditions will legitimately wear out a tire more quickly in one section than in another, and exact mileage is rarely recorded for a pleasure car.

"The careless driver who misuses his tire, or the unscrupulous driver who misrepresents the distance his tire has covered, both profit unfairly from a mere mileage guarantee. And the careful driver is the loser every time, for in reality he must pay the additional cost of unjustified allowances to the careless driver who relies upon his guarantee and is indifferent to tire damage.

"Standard tire manufacturers have been through all these experiences and long ago found it unfair to the vast majority of drivers and generally uneconomic and wasteful to guarantee a specific mileage. The practice of giving such guarantee therefore was discontinued some years ago, to the satisfaction of the riding public who soon found it more profitable to ride on good tires than on guarantees.

Old Warranties Were Unfair

"A good watch and a good tire will run satisfactorily if properly cared for. They will not do so if abused—and a guarantee that they will is likely to engender carelessness and abuse.

"Where a tire goes wrong what the driver needs is service, not a guarantee. Manufacturers, realizing this, have spread over the whole country a network of small sales stores which give all manner of tire service right where it is needed. The maintenance of such widespread services depends upon the public support of these local tire merchants."

The basis of adjustment will be "reasonable expectancy" of service. Sales managers have warned adjusters at the branch offices that they must guard against using the appearance of the tread, or any other single factor, as a basis for adjustment. The adjuster will be expected to figure out the approximate service that the customer has a right to expect as an average and base the adjustment on such *average expectancy*.

Failures which occur after the normal life of a tire will not be held to warrant adjustment consideration, since such failures may be properly attributed to variation in operating conditions or to a slight variation in the product, which is unavoidable.

While it is the intention of the manufacturers to fully protect the consumer, it is not intended to interpret the warranty in such an extravagant manner that legitimate sales will be changed into replacements, thus depriving the dealer of his profit.

Basis for Adjustments

The fundamental principles of handling adjustments has been set down as follows:

(1) Adjustments will be restricted to defective tires only. Policy adjustments will be completely discontinued.

(2) Failures which occur after the normal life of a tire do not warrant adjustment since such failures may be properly attributed to variation in operating conditions or to a slight variation in the product (which is unavoidable) rather than to an imperfection.

(3) Replacements will be based on reasonable expectancy rather than on time or mileage.

(4) The use of the Claim Form, Report on Claim, and Confirmation of Replacement will be continued.

(5) Transportation expense must be prepaid on articles returned for adjustment consideration.

While the extensive publicity given to the warranty merely promises fair treatment of claims, the manufacturers anticipate that some consumers will interpret this publicity to mean that replacements will now be made on a liberal and extravagant basis. Consequently, it is quite probable that such individuals will make unreasonable demands on dealers and manufacturers, but these are to be resisted.

Of the 44 manufacturers offering the new pledge of performance to the tire buying public, 29 are charter members of the Institute, having signed the organization declaration at the meeting on June 1. The other 15 members have since become affiliated with the organization, and it is expected that still others of the remaining tire manufacturers will join in the near future and make the industry practically a unit in supporting this new movement.

GENERAL MAY BUILD LOS ANGELES PLANT

W. E. Fouse, vice-president of the General Tire & Rubber Company, Akron, is now in Los Angeles to study the advisability of locating a branch factory there. There are already four major tire plants in the California city.

"The General Tire & Rubber Company is conducting an investigation to determine the advisability of building a branch factory in Los Angeles," Mr. Fouse stated. "It is only a matter of time until Los Angeles displaces Akron as the center of the tire industry.

"If a survey of the Pacific Coast markets shows that the establishment of a plant at the present time would be desirable, I will deliver an unqualified recommendation to our Eastern headquarters."

EASTERN MEN TO RUN WILDMAN RUBBER CO.

The factory and real estate of the Wildman Rubber Company, at Bay City, Mich., have been purchased by a group of Eastern men who expect to use it for the manufacture of inner tubes. Production at the rate of 2,500 tubes a day will be started within three months, it is announced.

The new company, which is to be known as the Bay City Rubber Company, will be managed by H. J. Lucier, of Boston. The factory was built by a group of Ohio men, headed by W. W. Wildman, at a cost of $500,000, but was never equipped with machinery. It was sold under a mortgage recently to S. J. Tennant, the builder.

Dunlop Sales Are Doubled

Unit sales of the Dunlop Tire and Rubber Company, Buffalo, during July increased 97 per cent. over the figures for July, 1927, and were 40 per cent. higher than in June, 1928. For the first six months of the current year, sales were 60 per cent. higher than for the first half of 1927.

The traffic committee of the Rubber Association of America, Inc., will hold its annual outing at Cumberland, Md., September 10 and 11, as guests of the Kelly-Springfield Tire Company. The committee has regularly held a similar meeting for several years.

RUBBER MEN TO SPEAK AT SAFETY CONGRESS

Special Sessions for Rubber Section Will Last Three Days With Several Talks and Discussions at October Convention in New York.

FIVE hotels will be required to house the 110 meetings, 325 speakers and 6,000 persons expected at the Seventeenth Annual Safety Congress, which will be held at New York City, Oct. 1-5 inclusive, when the question of how to check accidents on the streets and highways, in other public places, at home and throughout industry will be considered.

Members of the Rubber Section of the National Safety Council will get together at luncheon, following the annual meeting. There will be no charge for admission, and both members and non-members will be welcome. The Rubber Section sessions will be held on Monday, Tuesday and Wednesday, Oct. 1-3, in the Hotel McAlpin.

At the Monday noon luncheon, R. G. Knutson, member of the Industrial Commission of Wisconsin, will dwell on "Safety Moves Forward—And Why," after which there will be round table discussion of "Getting Down to Brass Tacks."

On Tuesday morning, after the address of Chairman Salisbury, G. W. Cook, of the Travelers Insurance Company, will dwell on "Safety in the Design and Use of Vulcanizers," and F. J. Hoxie, of the Associated Factory Mutual Fire Insurance Companies, will talk about "Static Electricity in the Rubber Industry." W. S. Smith, manager, safety division, Milwaukee Association of Commerce, will discuss "The Ramification of Safety Interest."

Reports of Committees will be presented on Wednesday morning, after which L. J. D. Healy, technical superintendent, Federal Division, Fisk Rubber Company, will dwell on "Health Hazards in the Rubber Industry." Another feature will be a discussion of "Safety Kinks," which will be led by C. L. Hungerford, division of safety and hygiene, Firestone Tire & Rubber Company.

The entire program of the Rubber Section has not yet been completed and several new topics will be announced in the final edition of the Congress program.

ASKS REDUCTION IN RATES ON CRUDE RUBBER

The traffic committee of the Rubber Association of America, Inc., has filed a complaint with the Interstate Commerce Commission against the present railway freight rates on crude rubber. An appeal is made for a reclassification of crude rubber to take it from Class 4 to Class 5. Such a change would mean that the freight charge per hundred pounds on crude rubber shipped from New York to Akron territory would be only 40 cents instead of 47 cents as at present. For Boston territory the change would be from 38 to 27½ cents; for St. Louis territory, from 77 to 66 cents; and for Chicago territory, from 66 to 56½ cents. The committee anticipates favorable action on their complaint.

Program of the Rubber Division, A. C. S., at Swampscott, Mass.

THE program of the sessions of the Rubber Division of the American Chemical Society at the annual fall meeting at Swampscott, Mass., September 10-15, has been announced.

The headquarters of the Society during the convention will be the New Ocean House and the Hotel Preston. In addition to the program arranged by the entertainment committee, there will be sightseeing trips on Tuesday and Wednesday, September 11 and 12, and a visit to Harvard University on Thursday afternoon. The entire Society is invited to a North Shore trip on Friday.

The formal banquet of the Society will be held on Wednesday evening, but the dinner of the Rubber Division will be at six P. M. on Thursday evening. All the meetings of the Rubber Division will be held at the Hotel Preston.

The detailed program for the sessions of the Rubber Division is given below.

Program of the Division of Rubber Chemistry, A. C. S.

H. L. FISHER, *Chairman*
H. E. SIMMONS, *Secretary*

Hotel Preston

Tuesday, September 11, 2.00 P. M.

1. Marion C. Reed. The Effect of Antioxidants in Typical Rubber Stocks.
2. Fred S. Conover. A Practical Method of Obtaining Dry Air for Humidity Control in a Rubber Laboratory.
3. Harlan A. Depew. The Mechanism of the Reinforcement of Rubber by Pigments.
4. D. D. Wright. A New Physical Test for Vulcanized Rubber.
5. D. F. Cranor and H. A. Braendle. The Evaluation of Carbon Blacks.
6. B. W. Nordlander. The Kinetics of the Vulcanization of Rubber.
7. A. A. Somerville. The Effect of Temperature on the Stress Strain Properties of Vulcanized Rubber.

Wednesday, September 12, 9.00 A. M.

Joint Meeting of the Colloid Chemistry and Rubber Chemistry Divisions.

8. Ernest A. Hauser. Rubber Structure Research and Its Bearing on the Elastic Properties of Colloids in General.
9. G. S. Whitby. The Structure of Rubber and Other Elastic Colloids.
10. Ernst A. Granquist. Pigment Dispersion in Rubber.
11. Benton Dales. The Colloid Chemistry of Rubber.

2.00 P. M.

SYMPOSIUM ON "POLYMERIZATION"

Joint Meeting of Cellulose, Leather and Gelatin, and Rubber Divisions.

12. G. S. Whitby. Aspects of Polymerization with Special Reference to Hydrocarbons.
13. Harold Hibbert. Polymerization Association, and Aggregation.
14. George L. Clark. X-Ray Contributions to the Problem of Polymerization.
15. S. E. Sheppard, A. H. Nietz, and R. L. Leenman. Supermolecular State of Polymerized Substances in Relation to Thin Films and Interfaces.

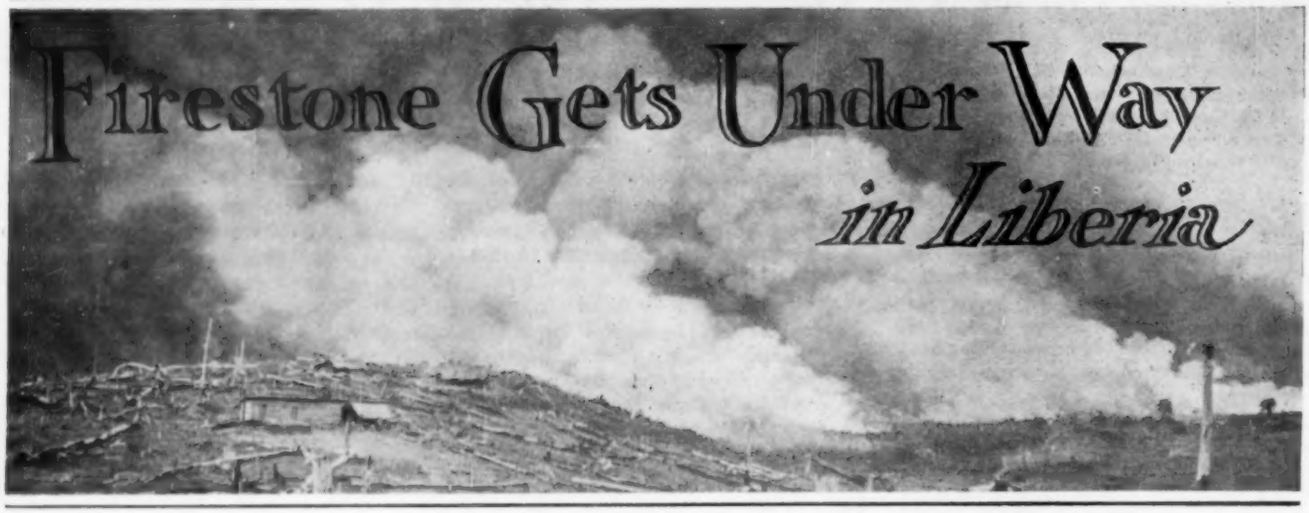
Thursday, September 13, 9.00 A. M.

16. E. Karrer and E. O. Dieterich. Time and Temperature Plasticity Relations for Crude Rubber as Measured with Goodrich Pastometer.
17. E. Karrer. Meaning and Measurement of Plasticity, C. G. S. Units and a New Plastometer.
18. W. J. Kelly. A New Theory of the Behavior of Rubber.
19. Jas. C. Walton. Microscopical Observations on the Vulcanization of Sulfur-Free Rubber Compounds.
20. T. Midgley, jr. Dimethyl Octadienes and Their Relations to Rubber.
21. A. D. Cummings and L. B. Sebrell. Some Observations on Rubbers with Low Nitrogen Content.
22. E. R. Bridgwater. A Comparison of the Rate of Combination of Sulfur with Rubber and the Rate of Vulcanization.
23. J. E. Partenheimer. Report of the Committee on Physical Testing.
24. E. B. Spear. Report of the Raw Rubber Specifications Committee.

Business Meeting.

6.00 P. M.

Division Dinner.



Harvey S. Firestone, Jr., Vice-President of the Firestone Plantations Company, Gives a Progress Report on the Liberian Concession

(EDITOR'S NOTE: *Because sufficient time has now transpired since the acquisition of the Firestone Liberian concession to make a definite progress report possible and particularily because of the recent charges brought by Professor Buell of Harvard University against the Firestone organization concerning its relations with the Liberian Government and the native laborers, the editor asked Harvey S. Firestone, Jr., to give to the readers of* THE RUBBER AGE *a story on the progress so far made along with any other remarks which would be in the nature of a refutation of the Buell allegations. Mr. Firestone replied by sending a copy of the following interview which he granted to James C. Young on the occasion of Mr. Firestone's recent return from Africa. Mr. Firestone endorses the interview as being fully explanatory of the work done and the policy under which the concession has been operated.*)

THE day we landed at Monrovia I felt almost as though I had reached another home," said Harvey S. Firestone, Jr., in discussing his recent visit to Liberia where the Firestone Plantations Company, a subsidiary of the Firestone Tire & Rubber Company, is establishing large rubber plantations. "This was my second trip, you know, so I was rather familiar with the blue African sky and the long, green shore line. But I mean that arriving in Monrovia was much like getting home. It was an odd sensation—visiting a corner of America in Africa. After contact with foreign names and faces, a visitor feels comfortable to go ashore and hear English not very different from our own. All around us were the signs of American activity and reminders of American customs.

"One of the first things that I saw, reflecting the new day, was a traffic policeman wearing the short khaki pants typical of Africa; the same kind of pants our Boy Scouts wear. A few years ago, Liberia had only one automobile and two dirt roads. Our company has developed seventy-five miles of good roads and now there are perhaps 200 autmobiles and trucks in the country."

"The Firestone enterprise means the conversion of a primitive world into a field of modern industrial operations. Not industrial alone, but embracing agriculture, communication, rubber culture and a great social experiment as well. The human factor is one of the most interesting of the whole undertaking. With 15,000 natives employed and other thousands to be added, the Firestone management has been studying the Liberian native intensively.

"When the first American settlers arrived a hundred years ago the west coast was an untouched land," continued Mr. Firestone. "These settlers established towns, fought the slave traders and hostile tribes, set up a democratic government and laid the foundation of what is now the Republic of Liberia. Their descendants number about 15,000 people, many of them well educated, who make up the ruling class. The remainder of the 2,000,000 population lives in a primitive or semi-primitive state. We find them to be naturally intelligent and good-tempered, a people quick to learn.

Part of Several Hundred Acres of Rubber Nursery on Firestone Plantation, Liberia, March, 1928

"They have taken to rubber culture as if it were a natural vocation. And they are learning many crafts besides. In addition to automobile drivers, we have trained masons and carpenters, some of them having had a little experience previously. They are running concrete mixers, turning out the blocks for houses, while others put up houses of the concrete blocks and lumber with surprising skill. We have also established a trade school to teach boys a trade and this is making progress. In time the school will have a fairly large capacity and we are cooperating with the government and the American Advisory Committee on Education in Liberia to extend public school instruction. In this connection, a special issue in textbooks is being printed, adapted to the native mind.

"I may say that Liberia is on the move in every direction. We have had to create an organization of broad scope to supply the men in the field. From the day we started one of our pressing needs was prompt communication. But it has taken us two years to develop and install a radio service. During my visit I sent the first message from our own station on the Du River to the station that we have put up in Akron, 4,600 miles across the United States, the middle Atlantic and part of Liberia. The stations are in regular communication, operated on short waves, and we are learning new things daily about radio operation in tropical latitudes.

Above: Panorama of Newly Planted Rubber Land with Duside Headquarters of the Firestone Du River Plantation. This Land Has Been Felled, Burned and Planted in the Past 18 Months

Center: President King of Liberia and H. S. Firestone, Jr., Inspecting a Group of Native Workers on the Plantation. Below: A Group of Native Workers Greet Mr. Firestone and Party During Visit to Div. 7 of Du Plantation, March, 1928

"I can sit here at my desk in Akron and transmit a question to Liberia instantly. We get reports of operations, of shipments and difficulties, and have a free interchange of questions, as though Liberia were on the next floor, connected by office telephone. I sometimes wonder how we ever operated under the old mail system.

"A volume of supplies moves regularly to Liberia. We must think of everything that mankind requires because Liberia has no supply depots aside from the small stocks of traders. But we are rapidly correcting this condition by means of our own trading company that sells any article from a hairpin to a talking machine. This company operates in the way of a chain store here and we are selling American goods to the natives at a little more than cost, which contrasts with the prices of European traders. Of course, the men of our staff and their wives patronize the stores, too. They carry in stock numbers of things that nobody remembers to bring. Before long we shall be able to furnish almost any article of necessity or luxury.

"The responsibility of keeping the plantation forces supplied is a huge undertaking. Every nut and screw, each can of gasoline, every tool and implement, must be brought thousands of miles and the nearest base of supply is back home, weeks away.

"The Du River plantation is 45 miles from the Liberian capital, connected to the city by one of the new roads which is regularly used for motor traffic. When I visited our Du River development this last trip, we passed through a double line of native laborers along eleven miles of road," continued Mr. Firestone. "There must have been 10,000 of them. In places they had raised arches made of palm leaves above the road, bearing the sign of 'Welcome,' or charms to bring good luck. I never saw more eagerness. Only a few of the men speak any English, but they understood that this inspection meant that the white men were pleased, and the work would go on. Each one tried to show that he was ready to do his part.

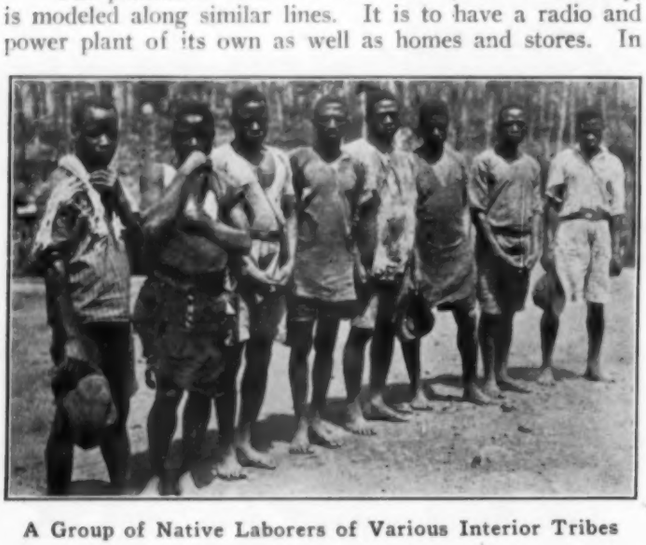
"The scene along this highway would have looked strange, indeed, to American eyes. Where the thick forests stood yesterday I saw miles of cleared land, the trees felled and burned, the undergrowth swept away. One burning is not enough to destroy the felled trees. We stack the charred remains and burn the area a second time. When the land finally has been cleared we set out young rubber shoots, or plants the seeds in straight rows.

"Last year our forces planted 3,000,000 trees that will later be reduced to half that number by selection. This year we should plant as many more. I am told that this

is a record operation in rubber culture in the same length of time. The oldest of our trees have now reached the ripe age of two years and are more than twice as tall as a man. Other thousands of acres of trees will swiftly follow them in maturity. Wherever we fell an acre of old trees we put in new rubber trees; one supplants the other. And we know that the Liberian soil and climate are well suited to rubber culture since we took over a small plantation which was set out a few years ago, where we are producing rubber of excellent quality.

"So far we have two new, organized plantations On the Du River high power electric lines have been installed to supply power, light and refrigeration. Special apparatus connected with the power plant purifies drinking water for the white forces. The plant likewise furnishes power to pump water through the plantation settlement. I found life on the Du River about as comfortable as it would be anywhere else. The company bungalows are cool and clean and have a distinctly American look.

"Our plantation on the Cavalla River, 250 miles away, is modeled along similar lines. It is to have a radio and power plant of its own as well as homes and stores. In



A Group of Native Laborers of Various Interior Tribes

fact, all of these are under construction. This plantation includes practically the same area as the other, some 50,000 acres, and the rate of progress has kept pace with that on the Du.

The Labor Question

Turning to the question of labor and the welfare of the natives, Mr. Firestone said: "We have found the Liberian willing and friendly in all of our relations. In two years our labor force has grown to 15,000 natives.

"Although the outer life of the Liberian natives is undergoing many changes, the company has sought to respect their customs and avoid anything like a disarrangement of their national life. From the day that the first plantation was laid out, cooperation between the government, the native population and the company has been of the happiest kind.

"Those who come to our plantation development to seek employment compose the largest part of our labor force. Others are those applying to several of our American administrative staff who visit the villages of the various tribes throughout the interior, accompanied by an interpreter, to employ labor when needed.

"When our representative has assembled a group of natives—let us say about 200—they start for the plantations accompanied by an agent of their chief who goes along to oversee their welfare. This trip through the forest trails is a great adventure. Many of the men never traveled so far from home before. They are not unlike children in their eagerness to see the new sights and to enter upon the new kind of life.

"On arriving at the plantations we give them a plot of ground for their use. The two hundred men work and live together as they have done at home. We grant them time enough, with full wages, to put up their houses and arrange their village. These houses are built of poles with a thatched roof and the sides are covered with clay. On the whole, the Liberian is a clever builder and his house is comfortable. We want to improve his village wherever possible without affecting his contentment. Using the ordinary village as a type, we plan to provide better sanitation and improve the native house as experience may indicate. It is proposed to build these model villages with four streets in the form of a cross. The center will be a place of recreation with buildings at the ends of certain streets containing shower baths and other facilities of American plumbing.

Work on Eight-Hour Schedule

"When the natives have built their houses and arranged their villages they are put to work felling and burning the forest or planting rubber trees in the territory already cleared. By this fall we will have planted 30,000 acres that will bear rubber in from four to five years. The largest of the newly-planted trees are two years old and we have a small plantation under production that was laid out some time ago.

"The men work eight hours a day on a wage scale that prevails for similar labor in other parts of Africa and on English and Dutch rubber plantations in the Far East. Every two weeks our paymasters place directly into the hands of each man, silver coins in payment for his work for that period. There are no contract restrictions as to length of service and every employee is entirely free to leave at any time. So far as I know, we are the only employers of African labor to establish the American working day. This day usually begins at six o'clock in the morning and by two o'clock the workers are through with their duties. The African does not stop for a meal at noon as we do, but takes delight in a generous dinner about six o'clock.

Studying Native Diseases

"The Liberian laborer is a natural agriculturist," continued Mr. Firestone. "We have been able to teach him the rudiments of sanitation and, as our model villages develop, we expect to carry on this education. In 1926 the Harvard School of Tropical Medicine sent a staff of ten scientists headed by Dr. R. P. Strong to Liberia for an investigation of native diseases, and, with our assistance, sent Dr. A. W. Sellards, in 1927, for further work in this connection. Our own medical staff, directed by Dr. J. B. Rice, is tending both native and American workers and spreading the doctrine of sanitation everywhere. We have also arranged for the Harvard School of Anthropology to take up another aspect of this general program, studying the background and origin of the major tribes of Liberia. An expedition has been in Liberia on this mission since January of this year. We hope, in this way, to determine what elements in the indigenous cultures of these peoples should be fostered and developed as they are introduced to modern civilization and economic development.

"Briefly, I may say that we are sympathetic with any undertaking that looks to the betterment of native life. We have joined with the American Advisory Committee on Education in Liberia to promote better schools and methods of instruction. Dr. James L. Sibley, representative of the Committee in Liberia, was recently appointed Educational Advisor by the government. His plans for the future are practical and comprehensive."

Hard Rubber Battery Production Has Been a Story of Progress

The Increase in Demand for This Product, Following the Introduction of the Radio and the Heavy Output of Automobiles, Has Been Responsible for Steady Developments and Improvements in Its Manufacture

ONE division of the rubber industry which has enjoyed rapid expansion from its relation to the automobile and radio industries has been the manufacture of hard rubber battery products. With 23 million automobiles in this country requiring new batteries at least every two years, an annual output of new cars which totalled 3,393,887 in 1927, and the large number of radio sets requiring renewals despite the introduction of new electric sets, the broad field of demand can be visualized.

Development of the product has proceeded with the increase in demand. The individual cell jar of semi-hard rubber of several years ago, three of which were imbedded in asphalt and surrounded by a wooden case to form a battery, has now been almost entirely superseded by a complete hard rubber battery box with cells and casing made as one solid unit. This can be shipped direct to the dealer, completely made up, dry, but charged. Just before installing the battery, the dealer pours in the acid, thus insuring the user of receiving an absolutely fresh battery.

In keeping with the times, however, there has been a demand for a cheaper article of the box type, especially for radio use. To meet this call a new variety has appeared on the market, known to the trade as the asphalt box, made entirely of this material, and pressed out mechanically without using the vulcanization process at all.

The reason that development of hard rubber products has been dormant until the last few years has been the prohibitive production costs due to slowness of cure. Until the use of organic accelerators became general, curing hard rubber products of any size required three to four hours. Since then much chemical research has been devoted to a study of hard rubber vulcanization as the one accepted compound of rubber and sulphur exists in this field. Thirty per cent of sulphur has been worked out as being the most efficient quantity in a compound. With the addition of accelerators like DPG which greatly speed the reaction but act merely as sulphur carriers, reduction in curing time is made possible. Accelerators in hard rubber compounds produce no increase in maximum tensile stength as they very often do in soft rubber goods. They act as regulators of the rate of combination of sulphur and rubber.

Mineral rubbers and resins can be used in hard rubber mixtures up to about ten volumes, beyond which point they have a weakening effect. Magnesium oxide and lime, common inorganic accelerators, show a decided hardening effect. Reclaims, many of which cannot be used in certain soft rubber goods, can be usefully employed along with burned and scorched compound, thus affording a convenient outlet for mill scrap otherwise of no value.

Making Individual Battery Jars

Although most of the plants for making the individual battery jars have been dismantled—so completely has the battery box taken their place—it will perhaps be well to review the method of their manufacture. Jars are made on white metal forms made of lead, tin and antimony, many plants making their own as they require very little machining. The raw stock is wrapped around these forms or cores, is covered with tin foil, and is then machine or hand wrapped to make them tight. Approximately four hundred jars are cured at one time, on cars in an open steam cure of about one hour and a half.

After the compound is mixed, it is sheeted to gauge on a coating calender and run into smooth, preferably treated liners, of about 50 yards in length. This roll is then run through a slitting machine, which divides the sheet in half. As the stock runs along a belt, another crew of workers cut the sheets across into an area of the proper dimension to wrap around the jar form, and a third crew cement the edges of the raw stock, and book the sheets between holland or treated fabric to prevent sticking and to facilitate their removal. The competition of the box type of battery with the individual jar made it very necessary to pare costs on the jars to the last fraction of a cent. This work of cutting and booking the raw stock for jars was done very cheaply when hooked up with the calender, slitter, and cementing operations as a continuous production unit.

The bottoms of the jars are ribbed, and the former method of applying the raw stock into the crevices was a hand knife operation. Finally a die or head for a tubing machine was made to tube out the bottom stock in ribbed form to fit the core exactly. This proved another cost saver.

The raw stock in books and the tubed bottoms on boards held apart by supports, then went to the assembly crew who warm the cores, place the raw stock on them, wrap, and remove the finished jars after cure. When the core is warm, it gets a coat of silicate of soda which dries very quickly, yet prevents the finished jar from sticking to the core, and facilitates its removal.

The bottom is then inserted on the core, fitting the ribs into place, and the sheet stock wrapped around the jar, being trimmed at the seam by knife. The stock is then rolled to press out trapped air between core and walls, and the jar covered with tinfoil, then cloth wrapped. Both hand and machine methods have been used on this operation but the hand method has proved as efficient as the machine. The jars are then loaded in a car and put in the vulcanizer to be cured. The curing time has been reduced from four hours to an hour and a half by modern compounding methods. Several attempts were made to mold jars under hydraulic pressure with steam, but it was found too costly, and the product too brittle. This old type of hard rubber jar required a certain degree of flexibility in the finished product, a common rule of thumb test being to press the two sides together until they touched. If the jar regained its shape and did not crack, it was pronounced OK.

After the jars were vulcanized, they were allowed to cool 5 to 10 minutes after being partly stripped from the cores to prevent breakage. A further cooling was necessary after they were completely removed, then they were ground to finished dimension as specified by customers, followed by an electrical test of 18,000 to 30,000 volts. If

a jar failed to stand up under the test, a hole was burned in it, caused by some particle of dust or metal. These were repaired by filling up the hole with gutta percha and re-vulcanized with a small electric vulcanizer. If the jar was warped or under size, it could be straightened and stretched by placing on a steam-table until soft when it was straightened by forcing it gradually over the core on which it was made.

The Complete Battery Box

The complete hard rubber battery box is the latest type of battery and consists of three cells and the outside casing in one complete unit. These boxes are vulcanized in an angle type molding press, with electricity instead of steam furnishing the heat of vulcanization. Each press molds one box at a time, but a pressman tends a whole row of from six to eight presses, unloading one after another according to a successive time schedule.

Raw stock after mixing is slabbed to gauge on even-motion mills, then cut into the size and weight of blank required. The mold consists of a center core and four side plates which tip at an angle of two or three inches to allow the insertion of the raw stock. The press is then closed, the current applied, and the box cures in 25 to 30 minutes. Under old compound conditions with steam, three to four hours would be required to cure one of these battery boxes. Care must be taken to see that there is enough stock to fill out the box. Hard rubber has a tendency to shrink during vulcanization and the most common cause of defective or worthless boxes is lack of stock. These defective batteries are not usable except to be ground up for hard rubber dust.

After removal from the presses, the boxes are placed on a conveyor to allow them to cool and passed along to have the overflow ground off, then finally inspected for defects and shipped. No electric test is necessary for this type of box as the walls are so thick that if the box is molded properly, it is sure to be tight.

Covers, Vent Caps and Handles

In order to make up a complete battery, jar covers, vent caps, and handles are necessary. Most jar covers are designed with three holes, the two end ones for terminals, and the center one for replenishing with acid, distilled water, and air. All of these accessories are molded on steam platen hydraulic presses, the same as used for heels, soles, etc., except that the platens are spaced further apart to allow for the wide molds.

The uncured stock for covers is cut out to approximate size, then perforated on a punch press. The molds are handled in the usual manner, being brushed with soap, water, and silicate solution to prevent sticking.

After the covers are cured and cooled, the overflow should be ground off. Vent caps with threaded grooves are made from tubing machine stock, of hollow tubing, and cut into short lengths about two inches long. These are then inserted over the knobs forming the cap in the mould, and cured in the same manner as covers. To remove them from the mould, each cap has to be unscrewed with a hand auger, then inspected for thread size, and appearance and assembled with the covers.

Battery box handles are a new development made necessary by the radio where it is frequently necessary to transport them from one place to another. These are made by slicing solid tubed rubber horizontally, placing the two halves of raw stock together with the metal handle between them. These handles are then inserted in the mould with the metal ends of the handle protruding from either side of the mould, and cured under steam and hydraulic conditions. Thus on removal the metal handle has a cushion grip of rubber securely moulded on. After the overflow is trimmed off the handles are assembled with and attached to the finished battery.

The Pressed Asphalt Battery Box

Within the last year many low priced batteries have been sold, which have the appearance of hard rubber battery boxes. They are, however, an excellent imitation and the very latest type of box, known as the pressed asphalt variety, is not a rubber product in any sense of the word.

These are made from an asphalt composition which is warmed to a dough consistency in ovens stationed adjacent to the presses. The presses exert mechanical pressure, and are not heated, in fact, the mold is encased with a cold water jacket to cool and harden the asphalt as the box is pressed out.

After the raw material is placed in the mold, the pressure is applied, and the completed box removed almost immediately. These asphalt boxes are thus produced at a bare fraction of the cost of hard rubber boxes, just as the latter proved cheaper to make than the jar construction which it superceded. They require no mixing mills, calenders, warming mills, cutting units, or heat—manufacturing conditions often dreamed about by rubber executives but never before realized. They make an excellent cheap substitute, but will never replace the hard rubber box for general satisfaction.

Color Effects in Battery Boxes

Another fairly recent development is the color effects in hard rubber boxes. A common mixture is the streaked effect of red and black quite common in tiling, and produced by incompletely mixing two colored stocks on the warming mill. Red boxes are not unusual, and a range of shades, of red, maroon, brown, olive green, tan, blue, and purple have been produced. This permits the manufacturer to make his battery distinctive if he chooses.

The field of hard rubber is limitless in its possibilities for development of new rubber products. With crude rubber once more low in price, talk of hard rubber wood and other possible uses may be revived.

10 YEARS AGO

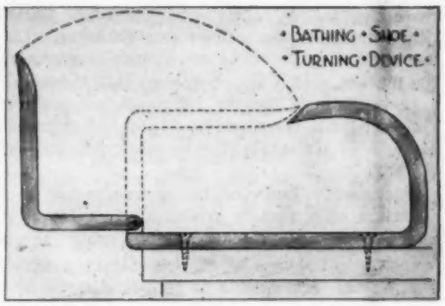
Items Reprinted from August 25, 1918, issue of The Rubber Age

IN order to encourage the use of South and Central American rubbers the War Trade Board announces that fifty per cent. of future rubber allocations will be for such grades . . . Bertram G. Work, president of the B. F. Goodrich Company, has consented to act as chairman of the Committee of the Rubber Industry of Greater New York for the Fourth Liberty Loan . . . Akron rubber plants are reported to be rapidly getting on a full war basis. Recent arrangements curtailing the output of pneumatic auto tires have resulted in the factories putting as many men as possible on government orders. Increases in these orders are offsetting curtailment of output . . . Gross sales of the Goodyear Tire & Rubber Company for the first eight months of the year total $88,390,432 . . . Plant No. 2, the new unit of the Firestone Tire & Rubber Company, Akron, is completed and will be but into operation September 1 . . . Rubber chemists prepare to meet at Cleveland, September 10 . . . Phoenix Rubber Company expands with completion of their new plant at Akron . . . Lee Rubber & Tire Company shows net earnings before taxes in excess of $300,000 on a gross business of $3,000,000 for the first six months of the year . . . The Goodyear Tire & Rubber Company has begun a compilation of possible positions which can be held by crippled soldiers . . . The Akron Standard Mold Company, recently organized by Anderson Fleiter, is now operating almost at capacity.

SAFETY KINKS *for the Rubber Factory*

No. 3 of a Series, *Showing How Various Manufacturers Are Protecting Their Workmen Against Serious Accidents. Presented by Courtesy of the National Safety Council and with the Cooperation of the Rubber Section thereof.*

LEATHER FINGER & THUMB PROTECTION FOR PICKING



THIS protector for the hand is used by operators in picking apart linings, insoles, etc., when the pad of stock is held in the left hand and the picker used with the right. This protector is simply an adoption of "sailors palm" with extensions for the thumb and index fingers. It is made of pliable but strong leather to cover the palm and index finger and thumb to the first joint. If the operator's knife or pick slips while picking stock this protector takes the thrust rather than the bare palm or finger, thus saving many cuts and possible infections.

THE sharp points of the old "V" knife caused many puncture wounds to operators. The recommended knife with rounded points is just as efficient and less hazardous. Knives of the same principle and design as the old type are still being used in many industries including the rubber footwear industry and in the manufacture of some mechanical rubber and molded rubber goods. They are also used in the cutting of tire fabrics. The new type of knife is recommended to replace the old in all such cases.

THIS device is designed to eliminate serious prevalence of sore fingers. By the old method of turning the operator would take the bathing shoe and last from the shoe rack and strip the shoe from heel to toe from the last. This would leave the shoe inside out. With the folding device shown above the operator strips the shoe as before, then with the movable arm upright, as in the sketch, the shoe is slipped on and at the same time pulled forward, to dotted line position. The shoe is then pulled over the shank of the device which turns over the shoe to its proper condition.

Rubber Industry Ends Half Year with Record Production

THAT the rubber industry in the United States is having a big production year is indicated by the latest quarterly statistics compiled by the Rubber Association of America. The sales value of all manufactured rubber products shipped in the second quarter of 1928 definitely attests to the fact that the industry is permanently in the billion-dollar class and occupies a strong position among the industrial activities of the nation.

The striking fact that more crude rubber is being used by American manufacturers this year than ever before in the history of the industry in this country is graphically brought out in these quarterly statistics. During the first six months of 1928 207,058 tons of crude rubber were consumed as compared with 202,458 tons during the first half of last year.

A total of 103,500 tons is recorded as the consumption of rubber of the domestic industry in April, May and June. This represents only a trifling drop of 58 tons from the first quarter consumption of 103,558 tons, but shows a fair gain over the figures for the second quarter of 1927 when 103,242 tons were absorbed. The slight falling off from the January, February and March totals took place in mechanical goods, boots, shoes and sundry items, while tires and tubes registered an appreciable gain due to the number of factories working at full capacity.

The sales value of all manufactured rubber product shipments in the second quarter of 1928 amounted to $296,218,000, a marked gain over the first quarter figures of $279,268,000. Particularly noticeable was the gain in the sales value of tires and tubes shipped during the quarter, these figures reaching the total of $214,216,000 as against $195,234,000 for the first three months of the year in spite of lower prices.

Crude rubber on hand at the end of the second quarter totals 92,391 tons, compared with 89,275 tons at the end of the corresponding period last year. This is a drop from the figure of 118,003 tons on hand at the end of March, 1928, and is a record decline for any quarter during the past three years.

The Rubber Association figures on crude rubber consumption and the total sales value figures are estimated to represent 92 per cent of the entire industry in the United States. The crude rubber inventory figures are estimated at 95 per cent. These figures are brought up to represent 100 per cent in this article as well as in statistical tables in this issue of THE RUBBER AGE.

A Scheme for Accelerator Classification

By R. P. DINSMORE and W. W. VOGT,*

Goodyear Tire & Rubber Co., Akron, Ohio

MUCH has been written about the constitution and chemical behavior of vulcanization accelerators. Theories have been advanced regarding the mechanism of vulcanization effected with their aid. Yet even the authors of such papers—presumably best qualified to interpret their contents—would hesitate to predict, from chemical structure, many of those features which are of practical interest to the rubber manufacturer. Nevertheless, an increasing number and variety of organic accelerators are being offered on the market, and it is not strange that the mind of the average rubber man is confused by the excess at his command and the conflicting claims of the distributors. In these circumstances it is natural to hesitate to undertake the somewhat formidable task of sorting and classifying.

Fortunately, however, it is not necessary to do all the work of classification on a factory scale. Certain laboratory helps are available and can be used to reduce considerably the arduousness of the task.

It is believed that an outline of such methods, a discussion of their significance, and a table of results, may be helpful to many in the industry, and it is for this purpose that this paper has been written.

For the sake of brevity, we have tabulated the accelerators by classes, where possible, rather than by individual compounds. Our classification is as follows:—(1) *Dithiocarbamates,* represented by such accelerators as Vulcacit-P, Superac and Grasselerator 552. This also includes the metallic salt of dithiocarbamic acid such as the Supersulphurs Nos. 1 and 2. (2) *Xanthates,* zinc salts of ethyl, propyl and butyl xanthic acid. (3) *Thiurams,* these include tetra methyl thiuram mono- and di-sulphides. (4) *Mercaptobenzothiazoles,* including metallic and amine salts. (5) *Vulcanol,* not a class. (6) *Faster Aldehyde Amine Derivatives,* such as A-16 and A-20, B. B., Grasselerators 808 and 833, Heptene. (7) *Paranitrosodimethylaniline,* not a class. (8) *Ethylidene Anilines,* A-7, A-19, Crylene, R & H-40 & 50, Tensilac 39 & 41, Vulcanex, Vulcone. (9) *Aldehyde Ammonia,* not a class. (10) *Guanidines,* such as diphenyl and di-ortho-tolyl, phenyl-ortho-tolyl and triphenyl guanidines. Triphenyl and tri-ortho-tolyl, guanidines differ in speed and strength from properties listed in the table. (11) *Hexamethylenetetramine,* not a class. (12) *Thioureas,* diphenyl, di-ortho-tolyl and di-meta-xylyl thioureas.

In Table 1, various accelerator properties have been listed in the approximate order of their interest to a prospective user. Speed and scorching tendencies have been given a numerical classification, increasing numbers indicating decreasing activity. Other comparisons are indicated in qualitative terms, the basis for which will be explained later in the paper. The terms "No Load" and "Blk Load" refer to compounds containing no pigment loading and carbon black loading respectively. The sub-classes refer to the stress-strain stiffness and the tensile strength produced by the various accelerators in these mixings. The other headings are self-explanatory.

Table 2 is a list of some of the more common commercial accelerators with their chemical names.

When a rubber manufacturer questions the suitability of an accelerator for his purposes, he is in reality seeking an answer to some or all of the following questions:—(1) *Speed.* Does it work best at high temperatures (40 to 60 lbs. per sq. in.) or at low temperatures (5 to 30 lbs. per sq. in.) and how does the speed at high and low temperatures compare with other well-known accelerators? (2) *Handling.* What are its scorching tendencies at handling temperatures? Does it soften rubber? Does it disperse readily? (3) Does it work best with high or low sulphur? (4) *Non-loaded stocks.* Does it give high stiffness and tensile strength in stocks without pigment loading? (5) *Carbon Black Mixes.* Does it give high or low stiffness and tensile in carbon black stocks? (6) Is it persistent during cure? (7) Does it have antioxidant properties? (8) Do its vulcanizates stiffen upon ageing? (9) Is it suitable for air cures? How does its rate of cure in open steam compare with mold cure? (10) Does it require stearic acid? (11) Is it stable in uncured stock or does it lose strength?

It will be noticed that some phase of curing is involved in nearly all of these questions. It is obvious that if comparisons are to be made with other accelerators, or, in fact, for various ratios of a given accelerator, comparable conditions must be observed, and especially where stress-strain properties are to be compared, comparable states of cure should be obtained.

Elsewhere (*Ind. Eng. Chem.*, 1926, **18**, 145), the disagreement among rubber technologists, as to cure criteria, has been referred to, but the method, in brief, is to select as the optimum of a series of cures, that cure for which natural ageing produces the least change in physical properties. This cure has been found, by experience, to be the one offering the greatest resistance to hand tear.

The table of accelerator properties herein presented, has been pre-

*This paper was read by Mr. Dinsmore before a meeting of the Institution of the Rubber Industry in London, March 13, 1928, and has been printed in the official *Transactions* of the Institution.

TABLE 1. ACCELERATOR CLASSIFICATION

	Speed at 40-60 lb. per sq. in.	Speed at 5-30 lb. per sq. in.	Handling Scorch	Handling Softening	Sulphur	No Load Stiff.	No Load Ten.	Blk Load Stiff.	Blk Load Ten.	Persis. during cure	Antiox. Prop.	Stiff. after Vulc.	Air cures	Stearic acid in ext. rubber
Dithiocarbamates	1	1	2	No	Low	High	High	High	High	Fugitive	None	Yes	O.K.	Unnecessary
Xanthates	N.G.	1	1	No	Both	High	High	High	High	Fugitive	None	Yes	O.K.	Required for high Mod. & Tens.
Thiurams	2	2	3	No	Low	High	High	High	High	Fugitive	Fair	Yes	O.K.	Unnecessary
Mercaptobenzothiazoles														
Captax	3	3	6	No	Low	Low	Low	High	High	Pers.	Good	Yes	O.K.	Required
Z-88	3	3	5	Yes	Low	High	High	High	High	Pers.	†Fair	Yes	O.K.	Required
W-80	3	3	5	No	Low	High	High	High	High	Pers.	Fair	Yes	O.K.	Required
Vulcanol	4	4	7	Yes	Low	High	High	N.G.	N.G.	Pers.	Fair	Some	—	Unnecessary
Faster aldehyde amine Derivatives	4	4	8	Yes	Low or med.	High except heptene		Vary poor to low	From poor to good	Pers.	Vary, some *fair	Some	Fair cure	Need very little
P-Nitroso-dimethyl aniline	4	4	5	Yes	Med.	High	High	Fair	Good	Pers.	Good	Yes	O.K.	Required, but needs no ZnO in reg. rubber
Ethylidene Anilines	5	5	9	Yes	Low or med.	Low	Low	Mostly Low	Fair	Pers.	*Fair	No.	Fair cure	Need very little
Aldehyde ammonia	5	5	10	No	Med.	Low	Low	Fair	Fair	Pers.	None	No	No cure	Unnecessary
Guanidines	6	7	11	No	Low or med.	High	High	High	High	Pers.	None	No	Poor cure	Need very little
Hexa	7	N.G.	12	No	Med.	High	High	High	High	Pers.	None	No	No cure	Required except with high ZnO
Thioureas	8	6	4	No	High	Low	Low	Fair	Low	Pers.	Poor	Yes	O.K.	Cures without stearic in high ZnO, but no set cure

*Longer cures and higher temperatures change accel. to sulphur reaction prod. which is not antioxidant. †Proportional to Thiazole content.

TABLE 2. COMMERCIAL ACCELERATORS

A-7	Same as Ethylidene Aniline. Soft.
A-11	Same as Vulcone.
A-16	An aldehyde amine.
A-19	Same as Vulcone.
A-20	An aldehyde amine liquid.
Aero-X Ami	Aniline di-isopropyl di-thiophosphate.
Aldehyde ammonia	Chemical name.
B.B.	Para-amino-dimethyl-aniline-butyraldehyde deriv.
Captax	Mercaptobenzothiazole.
Crylene, hard form	Same as Vulcone.
" Paste	" " " with Stearic acid.
Di-ortho-tolylguanidine	Chemical name.
Diphenyl guanidine	" "
Ethylidine aniline	Similar to Vulcone, but soft.
Formaldehyde aniline	Chemical name.
Grasselerator 102	Hexamethylene tetramine.
552	Piperidine piperidyl dithio-carbamate.
808	Butyraldehyde aniline.
833	Similar to 808, but faster.
Heptene	Heptaldehyde aniline.
Hexamethylene tetramine	Chemical name.
Lithex	Like Super-sulphur No. 2.
Methylene dianiline	Methylene diphenyl diamine.
Monex	Tetramethyl-thiuram mono-sulphide.
No. 999 lead oeleate	Chemical name.
Phenyl orthotolyl guanidine	" "
Piperidine piperidyl dithio carbamate	" "
R. & H. 40	Ethylidene Aniline. Soft.
50	Same as Vulcone. Hard.
Safex	Dinitro phenyl dimethyl dithio carbamate.
Super-sulphur, No. 1	Zn salt dimethyl dithio carbamic acid; clay base.
No. 2	Pb salt dimethyl dithio carbamic acid: clay base.
Tensilac No. 39	Ethylidene Aniline. Soft.
No. 41	Same as Vulcone.
Thionex	Monex.
Thiocarbanilid	Chemical name.
Trimene base	Triethyl trimethylene-triamine.
Triphenylguanidine	Chemical name.
Tuads	Tetra methyl thiuram disulphide.
Vulcanox	p. toluidine, modified Vulcone.
Vulcanol	CS_2 reaction prod. of butyraldehyde aniline.
Vulcone	Similar to ethylidine aniline, but hard.
W-80	D.P.G. salt Captax.
Z-88	Essentially NH_2 salt of Captax plus softener.
Zimate	Zinc salt of dimethyl dithio carbamic acid.
Zinc Butyl Xanthate	Chemical name.

pared by the use of the hand-tear criterion. It should be pointed out that the selection of some other standard, may considerably affect the arrangement of accelerators. In support of this conclusion it may be of interest to present a summary of some recent data collected by Dinsmore and Zimmerman.

Since the time for reconciliation of the conflicting ideas regarding cure criteria is apparently remote, it seemed that a useful purpose might be served by comparing several of the methods in stocks of different types.

In order to throw more light on this matter, mixings with four different kinds of loading were prepared, each cured with four different curing agents. These were further tested in three different plantation rubbers. Ten parts by weight of sulphur on one hundred of rubber was adopted for all unaccelerated cures. The accelerated mixings were adjusted to best cure of approximately 60 min. at 40 lbs. per sq. in. (as judged by hand tear) for hexamethylenetetramine and diphenylguanidine, and 60 min. at 20 lbs. per sq. ins. for mercaptobenzothiazole, using a blended batch of rubber. The various rubbers, of course, varied this time of cure considerably. The proportions of ingredients used are shown in table 3.

TABLE 3

Loading on 100 Volumes of Rubber	Curing Ingredients Lbs. Per 100 Parts of Rubber						
	Sulphur only	*Mercapto Sul.	*Mercapto Accel.	D.P.G. Sul.	D.P.G. Accel.	Hexa. Sul.	Hexa. Accel.
(1) No loading (1 vol. zinc)	10.0	3.20	0.35	3.00	0.30	3.00	1.00
(2) 20 vol. ZnO	10.0	4.00	0.50	3.50	0.75	3.00	1.35
(3) 20 vol. carbon black	10.0	3.50	1.50	2.75	1.30	4.00	1.75
(4) 20 vol. car. blk. plus 20 vol. whole-tire reclaim	10.0	3.50	1.00	2.75	0.75	4.00	1.25

*Note—Mercaptobenzothiazole batches contained 2 parts stearic acid.

The smoked sheet used was considered the fastest of the three rubbers, the brown crepe next and the pale crepe slowest.

The mixings were prepared and tested as outlined in a previous article. Detailed test data are omitted for the sake of brevity and it has been thought sufficient to present a few curves showing the relation between cure optima selected by the more or less popular tensile-product method and by our hand-tear method. A rather complete discussion of other methods as applied to non-loaded stocks, occurs in our former article, and, as will appear later, discrepancies for loaded stocks, are small.

Figure 1 shows the time of best cure in minutes, as selected by both hand-tear and maximum tensile product for three rubbers and four different loadings, cured with sulphur only. Figure 2 gives the same data for mercaptobezothiazole acceleration. Figures 3 and 4 show respectively diphenylguanidine and hexamethylene tetramine acceleration.

An examination of Fig. 1 discloses the fact that there is a wide divergence between the optima selected by hand tear and tensile product for the unloaded stocks. This difference is reduced by the addition of 20 volumes of zinc oxide for, whereas the effect as judged by tensile product is to speed up the cure, the hand tear shows an actual slowing down. Carbon black behaves about the same as zinc oxide and the addition of reclaim accelerates the cure considerably, bringing the results, by both criteria, close together.

Figure 2 shows a much closer harmony between the two criteria, in fact, the only divergence is in the unloaded stocks.

Figure 3 shows the same as Fig. 2. The relative positions of the rubbers are reversed by the different methods, for unloaded stocks. The graphs for the loaded stocks are close as before.

Figure 4 shows a similar tendency with somewhat more difference in the unloaded stocks, when judged by the two criteria.

Although carbon black and zinc oxide exert the same effect on cure in the sulphur stocks, in accelerated stocks it was necessary to increase greatly the accelerator in the presence of black to approximate the time of cure of the zinc stocks. This shows that the carbon black exerts its greatest effect on the accelerator. It is also apparent that the sulphur mix with reclaim and black is almost as fast as the mixes with rather high accelerator content and lower sulphur. This would indicate a strong influence exerted by high sulphur on reclaim vulcanization.

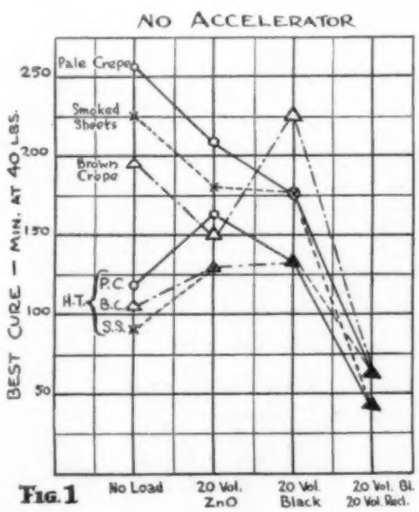


FIG. 1

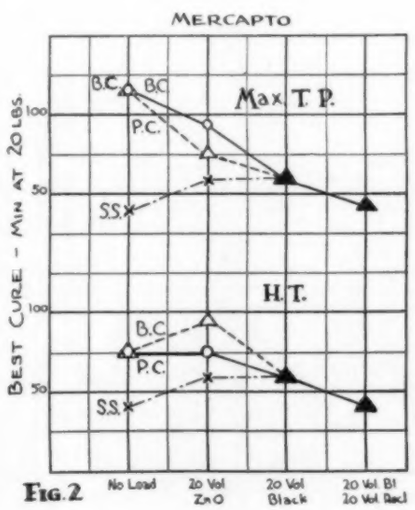


FIG. 2

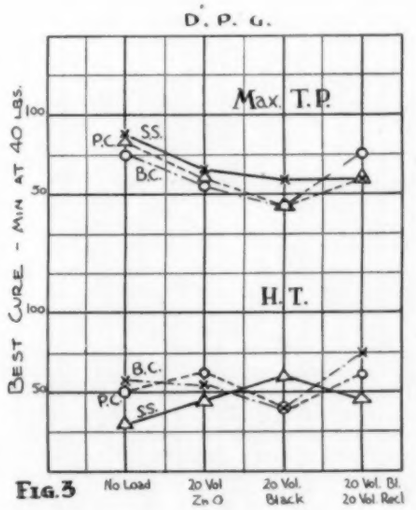


FIG. 3

To summarize the application of these results to the original problem, it is found that in unloaded stocks, especially when cured only with sulphur, but also when cured with accelerators, the discrepancy between optima selected by hand tear and tensile product is great. The hand tear method placed best cure at a much lower time than maximum tensile product. The relationship between the speeds of various rubbers is also frequently changed by change in criteria. For loaded stocks, of the type tested, however, both methods agree fairly well. Hence it would seem that those differences of opinion which arise as to proper cure criteria may well be limited to the field of unloaded compounds.

It must now be obvious that, for unloaded stocks, the selection of a cure criterion has an important effect upon the relationship of accelerators as shown in our table.

It may perhaps be well to say a word of warning about a method of comparison which has found considerable favor in the past, particularly among accelerator vendors. It is based on the indisputable fact, that, by proper selection of the proportions of sulphur and accelerator, most accelerators can be made to produce a flat tensile-cure curve. That is, the tensile rises to a maximum as time of cure increases, and the tensile then stays constant or drops but slightly for a considerable period. Many consider that the flat region represents satisfactory cure and that the curing ratios selected are, more or less, ideal and form a basis for comparing the value of accelerators. Lest there be any misunderstanding, let it be said here, that acceptance of the substantial equality of hand-tear and maximum tensile product as cure criteria, does not involve the admission that prolongation of the tensile product for a further period, indicates concomitent prolongation of good ageing properties. Some data may be of interest.

Figure 5 gives a representative result of the ageing characteristics of a so-called "flat tensile" stock. For all practical purposes, the tensiles of the original cures are substantially constant from 30 to 120 minutes, which is a quite creditable flat curing range. The results of the aged stock (6 days at 50° C. and 150 lbs. per sq. in. oxygen pressure) show that for cures longer than 60 minutes, the ageing qualities are much poorer than for the shorter cures. It will be noted that the percentage-gain-in-weight curve increases linearly with respect to cure. These data are typical of an overwhelming mass of data which lead the authors to the conclusion that from the standpoint of the oxidation processes, the rate of oxidation is a constantly increasing function of cure and bears no relation to the flatness of the curve showing the tensile strength and the time of cure, and as a result, that flatness of tensile strength over a range of cures means nothing at all from the point of view of the subsequent behavior of the stock on ageing.

Having explained the position as to cure relationships, a consideration may be made of the individual questions, propounded at the beginning.

1. *Speed.*—This may be determined by trying both non-loaded and loaded stocks with high and low sulphur at two temperatures, say 10 lbs. and 50 lbs. per sq. in. A range of curves at these temperatures will indicate a best cure for each. Four stocks will thus give an immediate rough classification. Further trials will be necessary to select the most suitable ratios.

Example:—

	Non-Loaded		Loaded	
	Low S	High S	Low S	High S
Rubber	100	100	100	100
ZnO (Vols. per 100 vol. R)	1	1	1	1
Gas Black or Clay (")	0	0	20	20
Sulphur (lbs. per 100 lbs. R)	3	6	3	6
Accelerator (")	1	1	2	2

Gas black and clay exert the greatest effect on cure. Most other pigments will take the same ratios as the unloaded stocks.

After best cures are selected for curing ratios which give best results, a comparison of the time and temperature of cure, together with amount of accelerator required, against a known accelerator, will enable one to classify the new accelerator, as to speed, fairly accurately.

2. *Scorching and its measurement.*—Well-milled rubber is essentially a plastic and, when subjected to pressure (as in the Williams parallel-plate plastometer), flows, and the flattened disc shows no change in dimensions on removal from the plastometer.

The softening effect of the accelerator on the rubber, which is generally very small or entirely non-existent, may be determined by this test. If, however, the rubber is not completely broken down or is scorched, then it possesses elastic properties. Hence, by imposing a pressure on such a sample, (*a*) plastic flow, (*b*) elastic deformation are produced. On removing such a sample from the plastometer, it will increase in thickness according to some function of its elastic properties. This recovery is taken by means of an ordinary thickness gauge after a definite time interval (usually 1 minute) after removal from the press. The difference between the reading so taken, and the final thickness of the sample, while under load in the plastometer, is taken as the recovery or scorch figure.* This method can be used to determine the scorching propensity of the accelerators by the following procedure. Samples of the raw stock (about 1 inch cubes) are heated in an air oven at 70° C., or, may be dropped into boiling water for increasing time intervals. The lower temperature of 70° C. gives a valuable forecast of the setting up or scorching of the stock in the liner or books after calendering, whereas the test in boiling water foretells whether the stock is liable to give burnt stock during the mixing operation. The usual 2 c.c. pellets are then prepared from the so-treated samples, and tested for final thickness and recovery figure in the plastometer under the following conditions:—Temperature 70° C.: Load, 5 Kgs.; Time, 3 mins.; Recovery taken 1 minute after removal from press. The thickness is recorded in millimeters and it is not necessary to figure the plasticity constant K as originally proposed by Williams.

A typical example of the results obtained by such procedure is given below.

Time of Heating at 70° C. in hours	Plasticity in mms.	Recovery in mms.
0	4.00	0.43
8	4.05	0.39
12	4.05	0.41
14	4.10	0.38
16	8.50	5.10

The abrupt change in properties between 14 and 16 hours is very striking, and furthermore allows of a rather exact determination of the relative scorching propensities. Of course, in many cases an inspection by tooth and thumb methods will suffice.

Dispersion.—All powdered accelerators give better dispersion if mixed in master batches. Hexamethylenetetramine and the thioureas must be finely ground to give good dispersion.

3. *High and Low Sulphur.*—The work outlined under "Speed" automatically fixes the sulphur ratios, which may then be compared with those used for known materials. It need only be added here that some accelerators may require high sulphur for short, low

*The exact method here outlined has been in use in the author's laboratories for the past four years and has been successfully used to determine the degree of breakdown of raw rubber and uncured stocks, as well as degree of scorch of various milled batches.

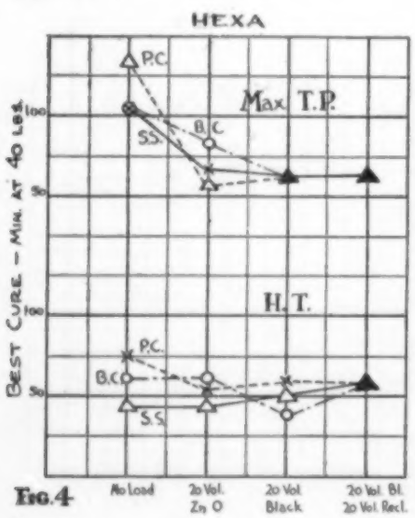


Fig. 4

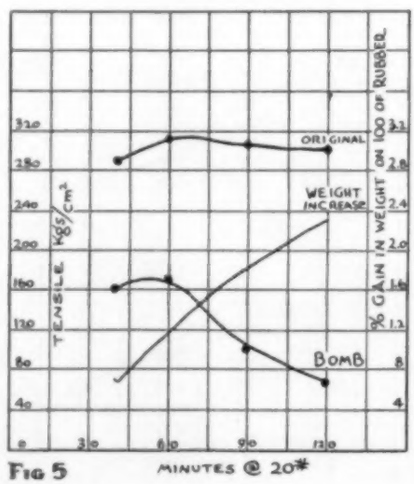


Fig 5

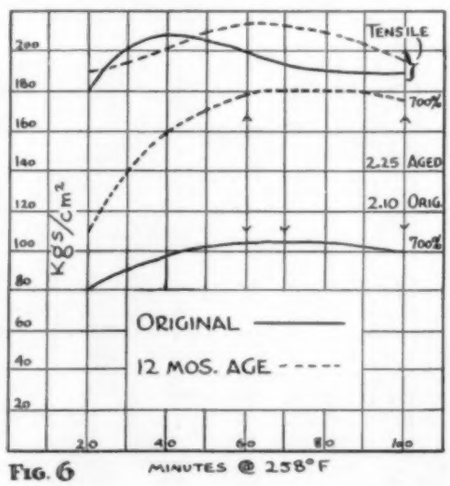


Fig. 6

temperature cures, and low sulphur for long, high-temperature cures.

4. *Non-Loaded Mixes.*—The work on non-loaded stocks, outlined under "Speed," forms the basis for this comparison. A stiffness figure, such as the load at 500 per cent elongation, is obtained at "best cure" together with the tensile strength. These may be classified, as compared with known standards, quantitatively, or qualitatively as "high" or "low."

5. *Carbon Black Mixes.*—The observations made under (4) apply here, except that, if the loaded stocks used in the speed test were not carbon black stocks, this work must be repeated with carbon black.

6. *Persistence During Cure.*—By this is meant the persistence of the curing influence of the accelerator during cure, as long as plenty of free sulphur is available. The accelerator may not remain in its original form, e.g., it may be transformed to its sulphur reaction product, but if its curing effect continues, it is said to be persistent. This is in contradistinction to the fugitive type which ceases to exert curing effect as soon as it enters into the curing reaction and which is progressively exhausted.

Twiss and Thomas (*Jour. Soc. Chem. Ind.*, 1923, **42**, 499T; 1925, **44**, 100T), use certain characteristics of the stress-strain cure as criteria, whereas Hardman (*Ind. Eng. Chem.*, 1927, **19**, 1037) uses the combined sulphur figure. The method of Twiss and Thomas has been adopted as, in this study, the physical properties are of immediate concern. It may be, however, that in certain connections, the combined sulphur figure is more significant, e.g., consideration of ability of a vulcanized compound to resist heat, or, study of ageing properties of overcured stocks. These points, however, can be independently determined.

7. *Antioxidant Properties.*—It has been shown (Bruson, Sebrell and Vogt) that Hevea rubber contains two or more so-called natural antioxidants, which are largely responsible for the protection of the rubber against oxidation. In order to study the antioxidant properties of accelerators, it seems most reasonable to do this in rubber stocks from which the natural antioxidant has been removed. Under these conditions, the ageing properties of the accelerator can be evaluated independently, without the complicating effects due to the natural antioxidant of the rubber. Therefore, by the simple expedient of extracting the crude rubber with acetone prior to its incorporation into the mix, the ageing qualities of the cured stock are due almost entirely to the accelerator used in compounding the stock.

TABLE 4

Accelerator	Amt.	Sulphur Amount	Cure		Tensile strength in kgs. per sq. cm. Original tensile strength	12 mos. tensile strength	Oxygen Bomb test 16 hrs. at 60° C. tensile strength	% Gain in wt.
			mins.	lbs. per sq. in.				
Captax	0.5	3.0	30	20	135	140	110	0.42
			50	"	145	150	110	0.57
			70	"	165	165	95	0.73
Vulcone	0.5	3.0	30	40	150	170	150	0.21
			50	"	165	170	50	0.63
			70	"	170	170	0	8.40
D.P.G.	0.5	4.0	30	40	160	155	0	14.4
			50	"	185	20	0	12.6
			70	"	195	20	0	12.1
"Hexa"	0.9	3.0	30	40	110	65	0	12.6
			50	"	145	90	0	13.0
			70	"	160	90	0	12.9
None	0.0	10.0	120	40	140	115	0	4.3
			150	"	155	75	0	3.8
			180	"	160	20	0	4.5
T.P.G.	1.0	6.0	50	40	145	70	0	9.7
			70	"	175	70	0	10.1
			90	"	185	75	0	10.7
"Thio"	2.5	6.0	50	40	125	145	0	2.8
			70	"	145	55	0	9.4
			90	"	155	20	0	11.0
Accelerene or p-nitroso DMA	0.5	3.0	20	40	105	135	125	0.20
			40	"	160	195	175	0.14
			60	"	170	210	170	0.13
Litharge	6.0	6.0	15	40	165	110	0	3.8
			30	"	180	105	0	10.0
			45	"	155	80	0	12.0

The important role that fatty acids play in vulcanization by accelerators has been sufficiently emphasized, so that it is evidently necessary to replace those removed by the extraction with acetone. Stearic or oleic acid in amounts of 1-2 per cent on the rubber supplies the necessary acid, and these materials have no antioxidant properties in themselves. Thus, batches consisting of 100 of acetone-extracted rubber, 5 of zinc oxide, and 1.5 of stearic acid, to which appropriate amounts of sulphur and accelerator are added, are mixed and cured over a suitable range of cures. The cured sheets are then subjected to natural shelf ageing or accelerated ageing tests.

The Bierer-Davis bomb test offers a very rapid and exact means of evaluating the resistance of oxidation of the stocks under test. However, equally valuable results may be obtained by the Geer oven test. In this connection, the criterion of resistance to ageing used by the authors has generally been that of tensile strength or product, but a very useful criterion is the percentage gain in weight which occurs on ageing in the bomb. Results on a few representative accelerators are given in table 4.

The results show that accelerene, captax and vulcone show definite antioxidant properties, particularly as revealed in the oxygen bomb tests, whether judged from the standpoint of tensile strength or weight increase. The 16-hour bomb test is more severe than 12 months natural shelf life.

8. *Stiffening after Vulcanization.*—This term is used to denote the increase in stiffness and sometimes also in tensile strength which takes place on ageing. It may or may not be accompanied by any changes in the amount of combined sulphur. Figure 6 gives a graphic picture of the changes in physical properties and combined sulphur which occurred on natural ageing for 12 months. The physical properties are represented by the load at 700 per cent elongation and the tensile strength of a range of cures, both in the original and after 12 months natural shelf ageing. The original properties are virtually constant over the range of 20 to 100 mins., i.e., no further increase in stiffness can be obtained by further cure, yet by storage, the stiffness of all cures is almost doubled. The combined sulphur changes which have occurred during the ageing period are insignificant. For instance, the 60 min. cure increases from 1.55 to 1.80 per cent. An original cure which would have a combined sulphur value of 1.80 per cent. would require a curing time of 70 mins. The resulting physical properties of such a cure would differ not at all from the 60 min. cure.

Hence one may say that the stiffening of the aged stock is practically independent of the increase in combined sulphur, or if it is dependent, then the very slight increase in combined sulphur which takes place on ageing exerts a tremendous effect on physical properties, which increase cannot possibly be obtained by very much larger increases occurring during the original curing period.

The point of interest in connection with accelerator evaluation is that this stiffening may be simulated by artificial ageing tests which eliminate oxidation effects. The primary result of oxidation is to cause softening in its early stages, hence an accelerated test may cause softening, stiffening or no change in the stress strain curve depending on whether the oxidation factor or the heat factor is predominant or whether the two are in balance. To study after-vulcanization effects the cured stock is, therefore, subjected to an elevated temperature in an inert atmosphere. Ordinarily, it is heated for three to six days in an atmosphere of purified nitrogen at 70° C. The results of such accelerated tests are, in general, in good agreement with natural ageing tendencies.

9. *Suitability for air and steam cures.*—Curing in hot air under pressure is relatively slow and promotes oxidation. Hence, speed and antioxidant properties to a large extent govern the ability to give satisfactory air cures. An air oven test is conclusive.

Most accelerators behave the same in open steam as in mould cures. Captax, however, cures faster in open steam.

10. *Stearic Acid Requirements.*—Most accelerators are improved by the use of some stearic acid. Some are harmed by an excess. Most accelerators require a certain amount of zinc oxide in order to function and this must usually be converted into a rubber-soluble soap for reaction. Thus many accelerators will not cure in extracted rubber—to which no stearic or similar acid has been added—though some of these will do so in the presence of a large excess of zinc oxide.

This whole question is an important one and should be solved for each accelerator by testing it in extracted rubber with and without stearic acid.

The effect of pigments on accelerator cures has already been mentioned. Carbon black absorbs certain accelerators directly, e.g. heptene, vulcanol. Clays also absorb heptene, vulcanol, diphenylguanidine and thiocarbanilide. In at least one case, namely mercaptobenzothiazole, the carbon black affects the cure, apparently due to absorption of the resin acids.

Another effect which must be taken into account is activation of accelerators by other materials and by each other. For example, many materials activate mercaptobenzothiazole, such as lead compounds, bases, amines, etc. Diphenylguanidine and captax are strongly activating probably by direct reaction.

One of the concerns of the rubber manufacturer, when he buys an accelerator is its stability before use. It has been observed, for example, that a diphenylguanidine masterbatch or complete batch of raw stock, will gradually lose curing strength over several months standing. The xanthates and aldehyde ammonia decompose in a few weeks standing in the air. Paranitroso dimethylaniline exhibits a peculiar tendency to cause a cement batch to become thin. The cause is unknown but it is not due to oxidation.

Thus it is seen that many facts must be known regarding an accelerator's behavior before its suitability for special practical uses may be determined. Many of these facts may be obtained by laboratory tests, such as have been outlined, and uniformity of procedure helps in an accurate classification. However, there are doubtless apt to be eccentricities of individual behavior and special requirements which can only be found by cumulative experience on a production scale.

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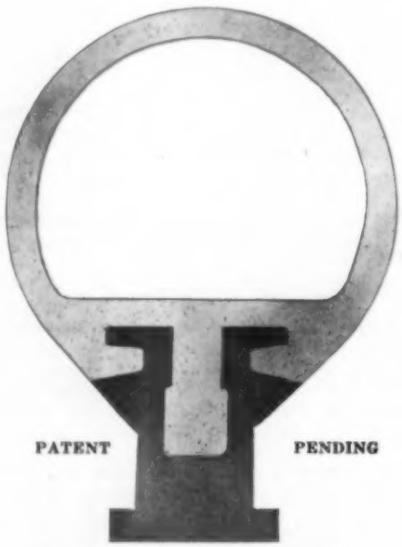

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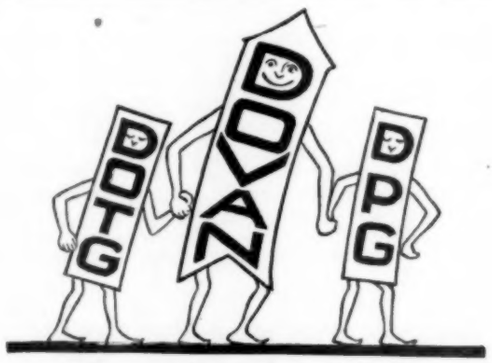

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EDITORIAL COMMENT

Applying the New Warranty

THERE can be no question that the Rubber Institute, Inc., has shown a notable degree of courage in tackling the tire warranty situation as the first major problem of the young organization. It now remains to be seen whether the Institute has the power to administer successfully the system which it has created.

As Director-General Andrews has pointed out, the tire warranty situation has long been one of the most difficult with which the tire industry has had to deal. He properly traces its beginning back to the time when conditions of motoring and tire manufacture were very different from the present day. It was apparent for many years that the definite mileage guarantee was incorrect and subject to grave abuses before it was generally superseded by a limited time guarantee against defects in workmanship and materials. This guarantee was worked out by the Rubber Association of America, Inc., and had gone far toward eliminating adjustment abuses.

The present revision of the warranty comes not from further changes in motoring conditions but from changes in merchandising conditions. Under the stress of competition from mail order and chain tire stores, who were free to reinstate the definite mileage guarantee for their own purposes, one manufacturer after another has sought to aid his dealers through guarantees or tire insurance of one sort or another. In some cases the definite mileage guarantee itself was being resumed.

The Institute meets this muddled situation by greatly increasing the breadth of the standard warranty previously adopted by the Rubber Association. Instead of guaranteeing their tires against defects in workmanship and materials only during the first ninety days, the tire manufacturing members of the Institute, acting as a body, now guarantee their tires against such defects for "the life of the tire." In other words, so long as there is a reasonable expectancy of further service from a tire, no defect in workmanship or materials shall prevent the motorist from receiving that service. Should it do so, the company will make good.

When the ninety-day warranty was adopted, it was argued that any defects of consequence would assuredly make themselves evident within ninety days from the time the tire was put into use and that there was no call for the manufacturer to assume responsibility after that date. This argument has, of course, been completely swept away, probably more from expediency than from a basis of fact.

If it could be faultlessly administered, there is naturally no more danger in the new warranty than in the old. There is no escaping the fact, however, that many motorists will see in the widely-heralded change an invitation to seek adjustments on tires which have already given a satisfactory measure of service or which have failed to do so by reason of the motorist's violation of some of the simple laws of tire conservation.

It is understood that all the tire companies subscribing to the new warranty have cautioned the adjusters in their various branches against laxity in applying the warranty strictly as written. Under the stress of competition, nevertheless, it will not be strange to see a loose system of adjusting reinstated unless the companies support the strict adjusters and reprove the lax ones. In keeping the companies strictly in line on a true interpretation of the warranty the Institute will have an opportunity to demonstrate that a new order has arisen in the American rubber industry. If it does not do so, its first bold move for better merchandising will probably end in dismal failure.

Tires and Rims for Airplanes

SINCE three months ago the Tire & Rim Association has been carrying in its monthly rim inspection report a special classification to show the number of airplane rims inspected and approved. This is further evidence of the progress which the aeronautical industry has made in the last year. When Lindbergh took off for Paris only a little more than a year ago the production of planes had not reached a point where it was worth while to count the rims necessary for them. Today the number of rims, while not yet large, has become worth regular recording. And it is just the beginning.

The astounding growth of the automobile industry was the fostering influence in the rapid strides in tire manufacture. It looks as if this bit of industrial history may repeat itself in the case of airplane tires. That the rubber industry is ready for such further impetus is indicated by the foresight which has already been shown in the development of efficient types of airplane tires and tubes.

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NEWS of the INDUSTRY

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FISK RUBBER SHOWS LOSS OF $4,983,134

Deficit Recorded for First Half Year Is Figured After Write-Down of Crude Rubber Inventory to Market Prices as of June 30.

THE drastic decline in the price of crude rubber since February resulted in a net loss of $4,983,134 to the Fisk Rubber Company and its subsidiaries for the six months ending June 30, according to the company's financial statement. This deficit was recorded after a write-down of crude rubber inventories and crude rubber in finished goods and work in process to the market prices which were current at the end of June.

From its profit and loss surplus the company has set up a reserve fund of $3,500,000 to take care of its anticipated loss from participation in the National Reserve for Crude Rubber, commonly known as the "American rubber pool." This also includes coverage of write-down on crude rubber commitments to market as of June 30, excepting deliveries in 1929 and 1930, involving in each of those years less than the requirements for one month.

Sales Are on Increase

Despite lower prices, the sales of the company during the half year totaled $30,989,846, as against a total of $28,417,798 for the six months ending April 30, 1927. The latter period, however, showed a profit of $2,124,593, while the eight months ending June 30, 1927, gave a profit of $1,717,307, equal to 88 cents a share on 825,244 shares of common stock then outstanding. Unit sales have increased 18 per cent over the first half of last year.

The consolidated balance sheet as of June 30 shows current assets of $34,044,195, including cash of $2,690,484, as against liabilities of $9,447,689, making net quick assets of $24,596,506. The ratio of current assets to liabilities was 3.6 to 1.

FISK RUBBER COMPANY

Consolidated Income Account

	6mos. end. June 30, '28	8 mos. end. June 30, '27.
Gross sales	$30,989,846	$40,876,877
Expenses, depreciation, etc.	†35,248,874	37,772,111
Operating loss	$ 4,259,028	*$3,104,766
Other income	30,780	12,812
Total loss	$ 4,228,248	*$3,117,578
Int., amort., etc	754,886	1,135,271
Federal taxes		265,000
Net loss	$ 4,983,134	*$1,717,307

*Profit. †Includes write-down of crude rubber inventory and crude rubber in finished goods and work in process to market value at June 30, 1928.

LEAVES POSITION IN GOODRICH ADVERTISING

Gates Ferguson, who for the past year and a half has been advertising manager of the B. F. Goodrich Company, Akron, resigned his position on August 10. The vacancy has been filled by the appointment of Phil J. Kelly, assistant manager of the department, to the position.

PHIL J. KELLY

Mr. Ferguson had been advertising manager of the Berrington-Hall Coffee Company, New York, before coming to Akron to work with Goodrich.

According to officials of the company, the appointment of Kelly as Ferguson's successor is in line with the Goodrich policy of making advancements from the ranks of the company's employes. Kelly has been with the Goodrich organization for two years, before which he was advertising manager for the Mason Tire & Rubber Company. He is an alumnus of the University of Illinois.

Ohio Rubber to Expand

The Ohio Rubber Company, manufacturers of mechanical rubber goods, has taken out a building permit to construct a 60 by 120 ft. brick building on its premises on Ben Hur Avenue, Willoughby, O. A short time ago this firm purchased 60 acres of land on Ben Hur Avenue and took out a permit to add a 2,400 sq. ft. floor to one of its present buildings. The contract for the new structure, which has been awarded to the Austin Company, represents a $50,000 investment, the major portion of which is being used to expand the shipping department.

JULY CONSUMPTION IS BELOW EXPECTATIONS

Stocks on Hand Continue to Decline Although Predicted Record Absorption by Manufacturers Falls Short of Realization.

WHILE failing to attain the record totals predicted in many quarters, the consumption of crude rubber in the United States during July reached 37,407 tons, only seven-tenths of 1 per cent below the monthly record established in June, and indicates the continuance of heavy manufacturing schedules by American rubber companies. Last month's consumption was 28 per cent above that of July, 1927, when 29,219 tons were used.

The total consumption in the first seven months of the current year has risen to 249,041 tons, an increase of 7.6 per cent from the corresponding period of 1927, when consumption totaled 231,241 tons. This is a new high level of absorption for a seven-month period and is further indication that 1928 will set a record for consumption of well over 400,000 tons.

Imports Fall Behind

Monthly imports, on the other hand, continued to fall behind the pace set in consumption, and stocks on hand accordingly were reduced to the lowest figure recorded since January, 1927. July imports amounted to 33,382 tons, against 38,667 tons in July, 1927, and 25,792 tons in June, 1928. At July 31st, stocks on hand had declined to 83,242 tons from the figure of 90,189 at the end of June.

Stocks afloat to the United States on July 31st totaled 42,304 tons, however, bringing the total of rubber in sight back to 125,546 tons, a decline of less than 5,000 tons from the June figure.

The feeling is current that August will see a total consumption that will surpass even the record of June, due to the fact that so many tire manufacturers are working their plants to full capacity. Estimates of a 40,000 ton consumption, made from some sources, seem hardly likely to be realized because of a slackening up in the production of mechanical goods and sundries.

The various grades of crude rubber imported during July, as compared with arrivals during the same month last year and June of this year, as reported by the Rubber Association of America, are shown in tons in the table below:

	July 1927	July 1928	June 1928
Plantations	37,060	32,536	24,752
Paras	871	585	582
Africans	46	11	25
Centrals	388	62	9
Guayule	295	188	424
Manicoba and Matto Grosso	7	—	—
Total	38,667	33,382	25,792

AUTO OUTPUT IN 1927 PLACED AT 3,335,805

Decrease of 20 Per Cent From Figures of 1925 Is Noted in Biennial Census of Manufacturers Announced by the Department of Commerce.

THAT American automobile manufacturers last year produced a total of 3,335,805 motor vehicles valued at $2,537,912,192 at wholesale factory prices is announced by the Department of Commerce from data collected in connection with the biennial census of manufacturers. This represents a drop of 19.9 per cent in number and 13.9 per cent in value from the census figures of 1925.

These government statistics relate to manufacturers whose principal products are assembled motor vehicles and do not include data for the production of establishments engaged primarily in the manufacture of bodies, parts and accessories for motor vehicles. The biennial census figures differ slightly from the monthly reports of the Department of Commerce because the former are based on production while the latter represent factory sales.

A decrease in number of establishments from 297 in 1925 to 262 in 1927 is recorded, being the net result of a loss of 55 establishments and a gain of 20 new ones. For census purposes an assembling plant is treated as a manufacturing establishment, for which reason the number of establishments is much larger than the actual number of manufacturers. Of the 262 establishments, 44 were located in Michigan, 34 in Ohio, 25 in Illinois, 22 in California and 20 in New York.

Closed Car Output Gains

One interesting trend shown is the rapid increase in the number of closed passenger cars being made. The number of this class of cars manufactured reached a total of 2,408,148 in 1927 as against 2,080,697 in 1925. The proportion of closed cars increased from 21.6 per cent in 1921 to 35 per cent in 1923, 58.3 per cent in 1925 and 85.5 per cent in 1927.

Aside from closed passenger cars, the only classes showing gains in production were government vehicles and hearses and undertakers' wagons. Government vehicles include fire department apparatus, patrol wagons, street cleaning apparatus and ambulances. Production of trailers also increased by 67 per cent.

Vehicles of the touring car type showed the most marked decrease in manufacture, dropping 80.7 per cent from 1,095,186 in 1925 to only 211,278 in 1927. Production of roadsters and runabouts declined 49.3 per cent from 390,062 in 1925 to 197,880 during the past year.

Of the passenger cars produced, the great majority were valued at $750 or less. Those valued up to $500 numbered 732,430, while those valued between $501 and $750 included 1,035,200 cars.

A classification of the motor vehicles produced follows:

	Valued at
2,873,380 passenger vehicles (not including public conveyances)	$2,174,718,977
8,944 public conveyances	27,836,038
1,430 governmental vehicles (Federal, state and municipal)	10,781,178
452,051 commercial vehicles	324,575,999
18,893 trailers	6,690,238
Other products	301,610,222

Gillette Building New Plant

The Gillette Rubber Company, Eau Claire, Wis., manufacturers of casings and tubes, has filed plans for the erection of a new four-story addition to its present plant facilities. The structure will be 75 by 160 ft. in size and will cost more than $60,000 with equipment. Work on the building will begin at once.

RUBBER TO REDUCE NOISE IN STREET CAR OPERATION

After long experimentation in an effort to reduce unnecessary noises in the operation of their street cars, the Market Street Railway Company in San Francisco, Cal., is now building a new design street car with several

"noiseless" features never before combined on a railway conveyance.

An interesting feature to combat noise is the use of rubber pads between car trucks and car bolsters and also between car body and car bolster.

PRICE DIFFERENTIALS ARE SET BY EXCHANGE

After approval by the board of governors, the adjustment committee of the Rubber Exchange of New York, Inc., announce the following price differentials between various grades of Hevea plantation rubber to prevail on all deliveries on the exchange during September:

"Against 'A' contracts—Off quality first latex crepe at .2 cents per pound; good F. A. Q. ribbed smoked sheets at .3 cents per pound; ordinary F. A. Q. ribbed smoked sheets at .6 cents per pound.

"Against 'BB' contracts—C blanket crepe at ¼ cent per pound; D blanket crepe at ½ cent per pound; No. 1 brown crepe at contract price; No. 2 brown crepe at ¼ cent per pound."

Trading begins September 1 in "BB" contracts for the first time, covering rubber of a slightly lower grade than the standard grades now traded in on the exchange. It is expected that the addition of these new grades will materially increase the volume of business transacted. The adjustment committee has also fixed the following limits of allowance on the two lowest grades deliverable against the "BB" contract: "D blanket crepe at ½ cent per pound; No. 2 brown crepe at ¼ cent per pound."

The Boston Woven Hose and Rubber Company is now running at full capacity with orders well booked ahead. The company's fiscal year ends September 1, and indications are that the shutdown for annual inventory will be as brief as possible. The annual statement will show profits in line with those of recent years, it is predicted.

30,000 PRESENT AT B. F. GOODRICH OUTING

More than 30,000 Akron employes of the B. F. Goodrich Company and their families attended the summer picnic of the firm on August 13 at Euclid Beach Park, Cleveland. Athletic events for every one were held in the morning and in the afternoon there was a program of water sports and other features.

The new Goodrich Fairchild monoplane flew about the throng with Mayor G. Lloyd Weil of Akron and W. E. Wright, president of the Akron Chamber of Commerce, as guests of President James D. Tew and Fred Swineford, service director. Music was furnished by the 52-piece Goodrich band.

It was said that the occasion marked the greatest mass movement of traffic in the history of that section of the state. Police of all municipalities along the route from Akron to the park co-operated in keeping the huge caravan from traffic snarls. Escorts were provided through towns, and a special escort of Cleveland police led the procession from the corporation limits to the beach.

SEIBERLING PROPOSES TO DOUBLE PRODUCTION

That the plant of the Seiberling Rubber Company at Barberton, O., will be producing 10,000 tires a day in 1929 is the prediction of F. A. Seiberling, president of the organization. This will mean a doubling of the present capacity of the factory.

New buildings are now being constructed and additional machinery has already been ordered to handle the demand for the products of the company. Mr. Seiberling made this statement on the occasion of a conference with members of the Fifty Year Club of Akron on August 13 at which time he also announced that he is about to start on a trip to the Pacific Coast.

GENERAL SHOWS GAIN IN ACCESSORY SALES

An increase of 27 per cent in tire accessory sales during the first eight months of its fiscal year, ending August 1, is announced by the General Tire & Rubber Company in a comparison with the corresponding period of 1927.

The gains have been chiefly due to the introduction of the company's new rubber tire flap and tire luster, according to F. P. Harrington, accessory sales manager.

Seiberling Sales Gain

Sales of the Seiberling Rubber Company during July exceeded $2,000,000, it is announced. This represents an increase of 41 per cent. over the sales of July, 1927.

The Wm. R. Thropp & Sons Company, Trenton, N. J., have issued a new catalogue on their rubber mill machinery, including individual motor-driven mills, refiners, warmers, crackers, and washers. A new feature of all of their machinery is the inclusion of improved safety guards.

RUBBER POOL IS SAID TO BE LIQUIDATED

$100,000,000 National Rubber Reserve Declared to Have Been Abandoned as Unnecessary in View of the Lifting of Stevenson Act Restrictions.

HAVING served its purpose, the National Crude Rubber Reserve, commonly known as the American Rubber Pool, is said to have been completely liquidated. This pool, established in December, 1926, involved a fund of $100,000,000, credit for which was advanced by the National Bank of Commerce and the International Acceptance Bank, and had for its purpose the protection of American rubber companies against any sudden drop in prices of crude rubber.

A first credit of $40,000,000 was negotiated when the pool was instituted, and at the beginning of this year additional credits totaling $60,000,000 were secured because of the likelihood of the repeal of the Stevenson Act or the lowering of the pivotal price for rubber. Of the latter sum, $30,000,000 was for immediate use and the remainder for use "when and if needed."

Since Premier Baldwin's announcement of the withdrawal of British rubber restrictions after October, crude rubber prices have dropped from 40 cents to less than 20 cents, resulting in heavy inventory losses to the leading rubber manufacturing companies. With restrictions thus abandoned, however, the pool is no longer necessary as there should be no future price depressions from artificially established levels.

According to the original plans of the members of the pool, which included most of the leading manufacturers, it was to expire on August 1, 1927, but its existence was then extended to April 1 of this year. The general understanding of the additional credits negotiated was the indefinite extension of the life of the pool.

During the course of its operation, L. D. Tompkins, president of the General Tire & Rubber Company, acted in the capacity of nominal manager of the pool.

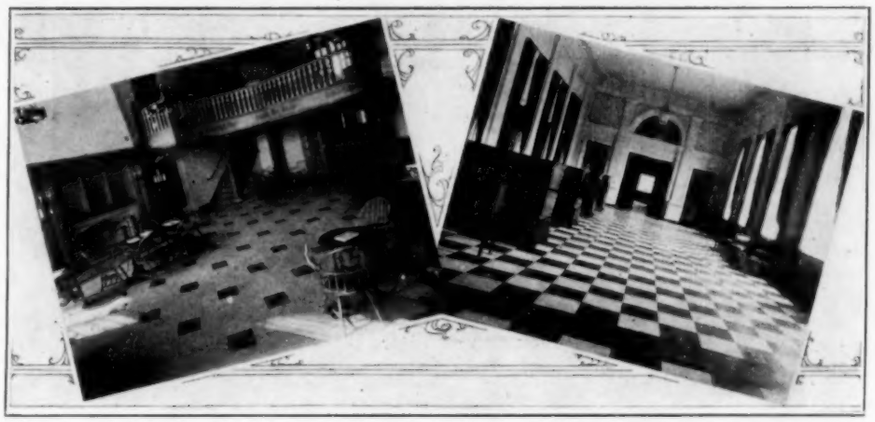
SWINEHART EMPLOYES HAVE ANNUAL OUTING

More than 2,000 employes of the Swinehart Tire & Rubber Company and their families made up one of the biggest picnics of the year at Chippewa Lake Park, Akron, on August 16. The committee in charge included H. J. Tennant, Paul Johnson, W. Willaman, E. G. Hulse, H. M. Croy and Ruth Kelly.

Parts Makers Expand Warehouses

The growing tendency of manufacturers of automotive parts, accessories and equipment to establish warehouse stocks at strategic points for the purpose of serving their wholesale distributors is shown in a survey just completed by the Motor and Accessory Manufacturers' Association. Of 122 companies reporting, 54 maintain warehouse stocks at points other than the factory while 68 do not. One manufacturer maintains 23 warehouses, another 17, and 37 others have two or more.

More Artistic Rubber Flooring Installations



Photos by courtesy Goodyear Tire & Rubber Co.

HERE are two attractive installations of rubber flooring that add to the dignity of their respective surroundings. The illustration on the left shows a library at Dartmouth College at Hanover, section of the Gaylord Farm Sanitarium at Wallingford, Conn., while the photograph on the right is a corner of the handsome library of Dartmouth College, at Hanover, N. H.

NEW GOODYEAR AIRSHIP MAKES SEVERAL TRIPS

Christened with a flask of liquid air by Mrs. Howard Hyde, daughter of President Litchfield, the Puritan, newest airship of the Goodyear Tire & Rubber Company, was launched at Akron on August 6. The new helium yacht, which is 128 feet long and has a gas capacity of 86,000 cubic feet, was built by the Goodyear-Zepplin Corporation.

Dr. Karl Arnstein is the designer of the ship and Jack Boettner the pilot. A week after its formal launching the baby blimp made the first journey to Canada of any American dirigible airship, visiting the company's plant at New Toronto, Ont., a trip of 230 miles. Among its passengers on this journey were C. C. Slusser, Goodyear factory manager, Hugh Allen, director of publications, and Vernon Smith, direction pilot.

On August 15 the dirigible took part in the dedication of the new airport at East Liverpool, O., and later paid a visit to Cleveland where city officials were taken up. The Puritan will be based at the Wingfoot Lake hanger, Akron.

This is the second airship to be acquired by the Goodyear Tire & Rubber Company for its own use. The Pilgrim, slightly smaller in size than the new ship, has now been in Goodyear service for four years and may in the future be transferred to the company's California plant.

AIRSHIP MAIL SERVICE IS PLANNED FOR SHIPS

Ship-to-shore mail service by dirigibles instead of airplanes was discussed at Akron on August 14 by W. C. Young, head of the Goodyear Tire & Rubber Company aeronautics department, and Harry E. Austin, aviation expert of Washington, D. C. Congressman Clyde B. Kelly has been asked to sponsor a bill for an appropriation sufficient to meet the cost of two dirigibles with a capacity of 2,000 pounds each, together with mooring masts and other equipment.

It is urged by these experts that dirigibles would not have to be carried aboard ships as is the case when airplanes are used for the purpose, but could fly out to meet the vessel and be pulled down to a mooring mast in the stern. Instead of flying to a suburban airport, the dirigible could moor to a mast on top of the post office bulding itself.

BRITISH CHEMISTS TO VISIT AKRON PLANTS

A group of distinguished British chemical engineers will be in Akron on August 27 to inspect the factories of rubber companies in that section as part of a joint industrial tour of Canada and the eastern United States. The tour is under the auspices of the American Institute of Chemical Engineers and the Institution of Chemical Engineers of Great Britain.

While in Akron the British and American chemists will be guests of a committee of Akron chemical engineers headed by George Oenslager, research chemist of the B. F. Goodrich Company.

PLANE DEMONSTRATED TO GENERAL OFFICIALS

Possibility of a second Akron rubber company purchasing an aeroplane was seen when a Ryan brougham, similar to the one used by Col. Lindbergh, was demonstrated to officials of the General Tire & Rubber Company on August 10. The plane was brought to Fulton Field, Akron, by officials of the B. F. Mahoney Company, San Diego, its makers.

CATALPO!

Falls Rubber Factory Displays Air Sign

IN co-operation with the Bureau of Aeronautics of the Department of Commerce, the Falls Rubber Company have painted on the roof of their plant at Cuyahoga Falls, Ohio, a large sign to aid aerial navigation.

The sign includes the town name in letters 15 feet high and extending over a length of 200 feet, together with an arrow pointing and giving the distance to Stow flying field.

It is believed that this sign will be of considerable assistance to aviators, although the flying field is only three miles distant. According to Department of Commerce officials, the use of these markers is much more necessary to the flyer in the near vicinity of the airport than at distant points.

RUBBER ASS'N SENDS WHITFORD TO FAR EAST

Dr. H. N. Whitford, manager of the crude rubber department of the Rubber Association of America, Inc., is leaving for the Middle East on September 8, to be gone about a year on a trip of investigation in the interests of the Association. He will make his headquarters at Singapore.

Dr. Whitford only recently returned from a similar trip during which time he made an exhaustive study of the extent of native rubber plantings in the Dutch East Indies. His report to the members of the Rubber Association is said to have been so comprehensive and important in its findings that the Association deemed it advisable to return him to the Middle East for further investigations. The report which he previously rendered has not been made public but it is understood that a summary will be released by the Association within a few weeks.

Dr. Whitford will also be remembered as chief of the crude rubber section of the rubber division, Department of Commerce, during the time that the Department was conducting various investigations throughout the world as to possible sources of crude rubber.

Picnic for Miller Workers

Employes of the Miller Rubber Company in the tire, tube and accessory departments held their annual picnic at Springfield Lake Park during the afternoon and evening of August 25. Two baseball games, races and other contests, dancing and a bathing beauty competition made up the day's program. Thomas B. Harper was general chairman.

CATALPO!

GOODYEAR EMPLOYES TO PRODUCE SAFETY FILM

Factory employes of the Goodyear Tire & Rubber Company are competing as authors in a motion picture scenario contest under the auspices of the company safety department. Prizes have been offered for the winning scenarios and they will be used in the company's safety campaign and will be shown this fall at Goodyear Theatre.

The Goodyear plant will serve as studio and Goodyear employes will compose the casts.

Akron Employment is High

Although the demand for all classes of labor in Ohio decreased somewhat during July, the rubber factories in the Akron district have all reported satisfactory schedules, according to the monthly report of the United States Employment Service. In Akron as light surplus of workers existed among rubber workers as in other lines, most of whom can be absorbed in other fields.

Full time operations, with overtime reported in some departments, were maintained in the rubber factories. The boot and shoe departments of some of the rubber companies, however, curtailed their forces while employment in the tire and tube departments increased.

No entries of rubber for export were received by the local market at Guayaquil, Ecuador, during April.

BANNER YEAR IS SEEN FOR MOTOR INDUSTRY

That 1928 will be one of the best years that the automobile industry has ever enjoyed is the prediction of Alfred Reeves, general manager of the National Automobile Chamber of Commerce. Probably a new record for annual motor car production may be established, he believes. During the first half of the year, production totaled 2,326,877 units which is exceeded only by the total of 2,483,463 for the first six months of 1926.

"Leaders in the industry believe that trade will continue strong throughout the year," says Mr. Reeves. "Ford's total will mount rapidly as he is just beginning to get back to normal production. This will have a marked effect on totals for the last half.

"The strong first half of the year has given employment not only to automobile factories, but to approximately 3,000,000 additional workers in allied lines. This, in turn, has stimulated retail trade and has helped to strengthen the entire cycle of business, with results which should prove favorable for the coming months."

INDIA TIRE EMPLOYES HOLD ALL-DAY PICNIC

Several thousand employes of the India Tire & Rubber Company and their families enjoyed an all-day outing August 11 at Brady Lake Park, Akron. Both offices and factory of the company were closed for the day.

The morning hours were devoted to bathing and beach sports, while races, field events and a baseball game featured the afternoon. Sterling Alderfer was chairman of the picnic committee and was assisted by Walter Robenstein.

JAPANESE OFFICIALS VISIT AKRON PLANTS

Suekichi Nakagawa, president of the Yokohama Rubber Company, and Kanesaburo Miyamatsu, his secretary, paid a visit to the plant of the B. F. Goodrich Company at Akron during the past two weeks. The B. F. Goodrich Company is reported to be financially interested in the company the visitors represent.

Both of the Japanese visitors were impressed by the latest developments in the manufacture of rubber products and expressed the belief that their own country will soon be producing a great percentage of the rubber goods it consumes.

British Want New Golf Ball

It is reported that members of the Royal and Ancient Golf Club are to submit to the United States Golf Association a proposal for a larger and lighter golf ball to reduce emphasis on the driving side of the game. The suggested new ball would have an increase of diameter from 1.62 to 1.68 inches and a reduction in weight from 1.62 ounces to 1.55. Similar proposals have been made by the United States Golf Association as long ago as 1925.

Names in the News

GILL F. QUINN, who is said to be the man who made the original survey for the Goodyear Tire & Rubber Company which decided their entry into field of rubber heel and sole manufacture, has been appointed sales manager for the Lima Cord Sole and Heel Company, makers of the Gro-Cord sole. Mr. Quinn will make an early trip to the South and West to introduce new designs to the trade.

WARREN F. BUSSE, who for the past year has been connected with the University of Wisconsin as research associate, has joined the B. F. Goodrich Company.

P. O. HEISLER, of Department 251-B, Goodyear Tire & Rubber Company, has been awarded $500 by the company suggestion board for a saving he effected in tire handling. Other awards, totaling $992,50, were also announced, including one of $175 to PAUL KONDEL, Department 231, and $150 to J. HARPER, Department 108-F.

HARVEY B. STOUT, of Kent, O., formerly with the Mason Tire & Rubber Company as salesman, has taken a similar position with the Hood Rubber Company.

MAX TURKHEIMER, managing director of the Societa Anonima Gomme ed Affina, Italian Firestone distributors, has just returned to Milan after spending a week at the Akron factories of the Firestone Tire & Rubber Company.

DR. L. B. SEBRELL has been appointed manager of the research department of the Goodyear Tire & Rubber Company. He succeeds A. M. HAMBLET who recently left the company.

G. C. CANFIELD, for the past two years a salesman in the Chicago and Pittsburgh territories for the Firestone Tire & Rubber Company, has sailed for Cape Town, South Africa, where he will assist in the company's export work.

C. N. GATES, export advertising manager of the Goodyear Tire & Rubber Company, recently returned to Akron after an extensive trip through the West Indies.

JOHN WESTREN, general manager of the Dunlop Tyre & Rubber Goods Co., Ltd., Toronto, will be present at the Canadian National Exhibition as the representative of the Canadian Manufacturers' Association.

FRANCIS SEIBERLING, of Akron, is a Republican candidate for Congress in his local Congressional District, having won the nomination at the recent primary election.

C. E. WAGNER, export manager for the Miller Rubber Company, sailed August 11 on the S. S. *Columbus* for Bremen, Germany, where he will start a tour that will embrace more than a score of European countries. He is also managing director of the Miller Rubber Export Co., Ltd.

L. O. GUINTHER, aeronautic engineer of the Goodyear Tire & Rubber Company, was aboard the second plane to finish in a Detroit to Colorado Springs air race on August 8. With him were his wife and brother and VANCE BREESE, pilot.

FRANK ESPENHAIN, former first vice-president of the Goodyear Tire & Rubber Company, was severely cut about the head and face when his automobile turned over in a ditch near Albuquerque, N. M., on August 12. MRS. ESPENHAIN suffered two fractured ribs and a broken finger, and two other occupants of the car were badly cut and bruised.

D. F. CRANOR, representative of the Binney & Smith Company, New York, spent the week of August 13 visiting in the Akron district.

MR. AND MRS. F. A. SEIBERLING will be hosts to the Fifty-Year Club of Akron at their estate, Stan Hywet Hall, on September 14. It is expected that 2,000 members of this unique organization will attend the reunion scheduled for that day.

RALPH SHAFER, coach of the Goodyear Tire & Rubber Company baseball and basketball teams, has resigned his position to enter the sales department of the company. ALTON MICHAELS, first baseman on the Goodyear ball team, will take charge of the nine for the remainder of the season.

EDWARD C. SWEENEY, who has been actively engaged in the rubber business for the past twenty years, has become associated with Whitehouse, Davis & Co., Inc., New York City. He will assume charge of the firm's general import department and of its crude rubber and kindred products department.

JOHN M. YOLTON, former balloon pilot with the Goodyear Tire & Rubber Company, who resigned last spring to enter the tire business in Texas, has returned to Akron and leased the Homer Hotel for a period of 20 years. Mr. Yolton joined the Goodyear organization in 1912 and was a pioneer in its aeronautical work.

A. G. MCKINNON, who has been factory manager of the Taunton Rubber Company, Taunton, Mass., for the past year, has resigned. Mr. McKinnon was chief chemist of the Tyer Rubber Company, Andover, from 1922-27 prior to which time he served as chief chemist of the Boston Rubber Shoe Company. He has not divulged his future plans.

RALPH H. CONVERSE, formerly assistant treasurer of the Converse Rubber Shoe Company, has entered the field of investment securities in New York State.

SIR STANLEY BOIS, who was taken ill while in Europe in connection with the educational work of the Rubber Growers' Association, has completely recovered and has returned to London.

H. E. RANDOLPH has joined the Southwestern sales staff of the Lambert Tire & Rubber Company. He has been with the India Tire & Rubber Company for the past three years, before which he was associated with the Kokomo and Miller companies.

CLARKE W. ADICKES has been appointed manager of the Charlotte, N. C., branch of the Miller Rubber Company. Born in South Carolina, Adickes has been well known for his activity in the tire field in the Carolinas for the past 14 years.

GEORGE SCHWORM has joined the advertising department of the *India Rubber World*. He was formerly assistant advertising manager of the Lorain, O., *Journal*.

W. ROSS CAMPBELL, formerly with the National Cash Register Company, has succeeded W. E. GNADT as representative of the Goodyear Tire & Rubber Company in Pocatello, Idaho. Mr. Gnadt will in the future be connected with the Goodyear factory at Los Angeles.

PAUL W. ROUS has succeeded W. L. APGOOD as salesman for the Goodyear Tire & Rubber Company in Ogden, Utah. Mr. Apgood resigned to open a tire shop of his own.

E. D. BARRY, builder and designer of the Goodrich factory at Los Angeles, has recently delivered addresses to auto association members at Colorado Springs, Denver and Pueblo on the subject of tire manufacturing methods.

ROBERT ROBERTS is now an active distributor for the Lee Rubber & Tire Company in Phoenix, Ariz. He was formerly manager of the Phoenix Rubber Company.

GEORGE J. BONNESS is now in charge of Ohio sales for the Hewitt-Gutta Percha Rubber Company. He was formerly manager of the firm's Denver branch.

HERBERT ANTOINE is now supervising the technical work of the Marion Insulated Wire and Rubber Company, Marion, Ind. He was previously associated with the Rome Wire Company.

J. M. EVERETT has been chosen director of the Peavey Rubber Company, Boston, Mass., distributor of McClaren tires. Mr. Everett was formerly manager of the Boston sales department of the General Tire & Rubber Company.

Timely Financial News

U. S. RUBBER COMPANY HAS $63,391 INCOME

Six Months' Earnings Include Profit of $1,000,000 from Plantations and Are Figured Before Inventory Devaluations of $14,147,659.

FOR the first six months of 1928 the United states Rubber Company reports a net income of $63,391 after all charges except adjustment of inventories. Crude rubber inventories as of June 30 were written down to 20 cents a pound, necessitating a devaluation, including full provision for participation in the National Crude Rubber Reserve, of $7,810,279, while devaluation of inventories of finished goods and goods in process amounted to $6,337,380.

This compares with net income, excluding earnings of the Plantations Companies, of $3,240,963 during the first half of 1927, after taxes, depreciation, interest, etc., equal after preferred dividends to 77 cents a share on 810,000 common shares. The company now has outstanding 651,100 shares of 8 per cent. non-cumulative preferred of $100 par value and 810,000 common shares of $100 par.

Sales for the first half of 1928 amounted to $88,320,329 despite lower prices, exceeding the figure of $88,110,626 for the corresponding period of 1927 but falling behind the high sales totals of 1925 and 1926. There was a substantial increase in commodity units sold. production of rubber from the plantations owned by the company increased substantially over the same period of last year. The sum of $1,000,000 was taken into the income of the company from this source. During the first half of 1927 the net profit of the U. S. Rubber Plantations, Inc., amounted to approximately $2,000,000.

"The unsatisfactory results as to profits," says C. B. Seger, chairman, "and the necessity of heavy inventory adjustments were due to the violent decline in the market price of crude rubber. At the close of last year the market price was 41½ cents a pound, which was consistent with the provisions of the British Restriction Act at that time, which fixed the pivotal price at 21 pence, equivalent to about 42 cents in New York.

"The company's inventories of crude rubber, as well as the rubber content in finished goods, were carried over at 40 cents a pound. On April 4, 1928, the British government announced that restriction would be discontinued on November 1, with the result that the market broke badly and the price went below 20 cents and has since remained at that figure. It is hoped with the removal of governmental restrictions and with the market price more nearly at the cost of production, that the menace of a widely fluctuating rubber market is largely removed, for the time being at least."

According to Mr. Seger, forward commitments for crude rubber were for conservative quantities and at prices averaging approximately at market, as was also crude rubber in transit in New York. The writing down of inventories of finished goods and goods in process, he states, does not represent a loss of value, inasmuch as the actual cost of production, before adjustment, indicates a profit at the current selling value of these goods after allowing for all selling and operating charges.

The total current assets of the company, as of June 30, were $119,152,831 with liabilities of $38,708,436, leaving a net working capital of $80,444,395.

UNITED STATES RUBBER CO.
Consolidated Income Account

	First half 1928.	First half 1927.
Sales	$88,320,329	$88,110,626
Expense, depreciation, etc.	85,195,399	81,717,975
Operating income	3,124,930	6,392,651
Interest	3,061,539	3,151,688
*Net income	63,391	3,240,963

*Before dividends on subsidiary stock and inventory adjustments.

CATALPO!

FALLS RUBBER COMPANY $2,500,000 NOTE ISSUE

Stockholders of the Falls Rubber Company, Akron, will shortly be asked to approve an issue of $2,500,000 7 per cent. three-year notes, it is reported. The purpose of the new issue is to furnish the company with additional working capital.

A group of Akron men has underwritten the notes. They will follow bills payable in order of security, but will come ahead of the stock and may be converted into common stock at any time within three years at $10 a share.

Late Stock Prices

	Last Price Aug. 20	Aug. 4	1928 High	1928 Low
Ajax	8	8⅛	14⅜	7½
Firestone	170	170	232	170
do. 6% pfd.	110	109½	112	109
do. 7% pfd.	110	106	111½	108
Fisk	9¾	11¼	17¾	8⅞
do. 1st. pfd.	63	70	91½	58½
General	165	167	190	165
do. pfd.	98	96	111	98
Goodrich	76	77⅜	99⅜	68½
do. pfd.	112	111	115⅜	109½
Goodyear Com.	55⅜	53¼	72½	45⅛
do. pr. pfd.	98⅝	96½	99½	92½
do. pfd.	—	—	120	100
Hood	27	25	43	25
India	42	37¾	45	16
Intercontinental	10	10	21¾	8⅛
Kelly Springfield	19⅝	19⅜	27⅞	15
do. 1st pfd.	—	—	80	58
do. 8% pfd.	—	68	84	55¼
Lee	19¾	20	24½	17¼
Miller	18	19	27	18¾
do. pfd.	79	77	97½	70
Mohawk	155	130	165	29¾
do. pfd.	79	—	87	55
Seiberling	45	42½	49½	35
do. pfd.	—	102¼	107½	102
U. S. Rubber	31½	32	63¼	27
do. pfd.	61½	62	109⅝	55
U. S. Rubber Reclaiming Com.	—	—	16½	11½

LITTLE ACTIVITY IN RUBBER COMPANY STOCKS

Price levels in the stock issues of the various rubber manufacturing companies have with few exceptions remained fairly steady, and no great interest has been shown during the past two weeks in trading in these shares. The volume of transactions has continued low on the different exchanges.

With the news of the losses taken by Fisk during the half year, both the common and preferred stock dropped to new lows for the year. Both, however, were equally quick in rebounding and finished fairly strong.

The most marked gain was made by Mohawk which rose from 130 to 155, only 10 points below its high for 1928. This company has been one of the few to show a healthy profit during the first half, and it was felt that its recent decline was hardly deserved.

India Tire & Rubber continued to gain and closed at 42 after considerable activity on the Cleveland market. Hood and Seiberling were among the others registering gains. The inventory devaluation of more than $14,000,000 by U. S. Rubber failed to cause the stock to drop more than a fraction of a point.

Greater activity and better prices are looked for in the remainder of the year now that all companies have taken their losses for the first six months and are starting the second half with clean slates.

RECEIVER NAMED FOR AMERICAN TIRE COMPANY

As the first step in a plan of reorganization, stockholders of the American Rubber & Tire Company, Akron, filed a voluntary petition in bankruptcy in the Federal Court at Cleveland on August 8th. The petition was referred to Harry L. Snyder, Akron referee in bankruptcy, who named Franck Burch, Akron attorney, as receiver.

Liabilities of $800,000 are shown in the petition, with assets of $250,000, represented mostly by land and buildings. The liabilities include $470,000 of bonded debt and $40,000 unpaid interest. **Floyd H. Snyder, president** of the company, holds 90 per cent of the bonded and unsecured debt.

An average of 500 tires a day has been produced by the company at Akron, according to officials of the firm, and the bankruptcy proceedings were instituted merely as the best way to effect a reorganization. A meeting of creditors is scheduled for the near future for the purpose of electing a trustee and completing the reorganization plans.

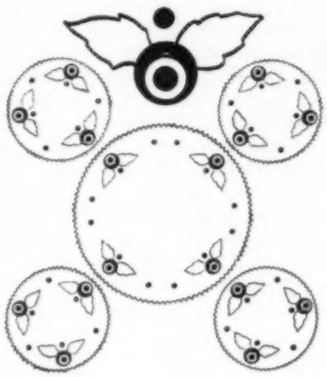
Goodyear Declares Dividends

The Goodyear Tire & Rubber Company has declared regular quarterly dividends of $1.75 each on its $7 first preferred and 7 per cent. preferred, payable October 1 to stock of record September 1.

Rubber Goods and Specialties

Luncheon Set

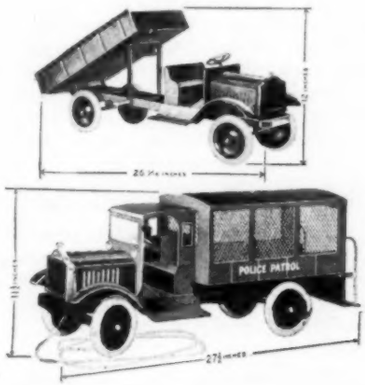
Consisting of a tube of rubber cement and a series of attractive rubber motifs to be placed on luncheon doilies of rubberized fabric, these luncheon sets are manufactured by the I. B. Kleinert Rubber Company, New York City. By squeezing a small amount of



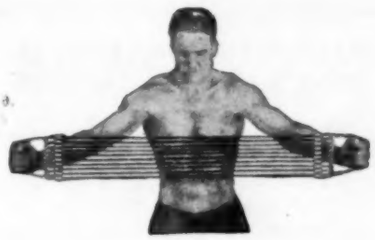
the rubber cement on to a saucer and applying it lightly to the motif, it is easy to attach them to the doilies in any pattern desired. The rubber motifs may subsequently be removed and other sets substituted for different occasions.

Rubber Tired Toys

The Keystone Manufacturing Company, Boston, Mass., offers two attractive automobile toys, both of which are equipped with rubber tires. A miniature police pa-



trol wagon has two full length seats on the inside with brass railing and a foot step in the rear. It has balloon tires and is furnished in attractive colors. The special dump truck illustrated is made of the same steel and same finish as the other toys of the Keystone line. It will hold 250 pounds, according to the manufacturer, and is equipped with a side lever to operate the dump. This truck does not contain the detailed construction of the other heavy steel toys of the same line and is offered at a lower price for special sale purposes.



Elastic Chest Pull

This progressive tension chest pull is now being offered by the Moosehead-Whitely Exercise Company, 1139 Tiffany Street, New York City. It is made of lively elastic cables covered with woven jackets in attractive colors and designs. The cables have snap-on couplings for detaching from the handles and thereby regulating the tension for progressive exercise. The steel handles are made with 3, 5, 8 and 10 continuous loops and are fitted with rubberoid grips. Each chest pull is sold together with an illustrated physical training course.

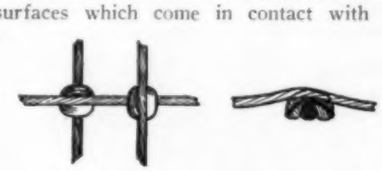
Toy Racing Car

A model of the racing automobile driven by Capt. Malcolm Campbell to a record of 207 miles an hour, this toy is now being

placed on the market by the Kingsbury Manufacturing Company, Keene, N. H. It is called the Bluebird Racer and is finished in bright blue over its entire length of 19 inches. A powerful spring motor furnishes driving force for the model racer, and its wheels are advertised as "equipped with Dunlop tires."

Tennis String Protectors

Intended to keep tennis racket strings in their best condition for the longest possible time and to give the player greater control, string protectors of rubber are offered to the sporting goods trade by the Tennis Specialties Company, San Francisco, Cal. The Smilie Tennis String Protectors, as they are named, have small rounded rubber surfaces which come in contact with the



ball and grip it in the same way every time. The centers of the protectors, where they are under compression between the strings, are hard fabric and not cushions so that none of the resiliency of the gut is lost. They are applied by lifting the strings at their crossings with a special tool that is furnished.

New Miller Shuglov

A new style in their "Shuglov" line has been announced by the Miller Rubber Company of New York. Featured by a new sliding fastener that is ingeniously concealed, these shoegear protectors are smart in line and color. A dignified buckle is a new addition and the colors offered are

brown and nude. They are made on a universal last with two types of heels, known as the universal and the Cuban. These overshoes are easily cleaned with a damp sponge and are claimed to assure perfect fitting. They are lined with a specially developed elastic cloth.

Shoe Tip Protector

Nailed on the welt with five clinch nails, this protector is intended to protect the shoe tips, according to its manufacturer, Edward Frank, 1614 San Pablo Avenue, Berkeley, Cal. It is made of rubber, either black or

brown, in strips 25 inches long which makes three pair. To use it the tip has to be cut off and the ends beveled with a knife. It is applicable to all sizes and styles of shoes and may be readily made to conform to any type and to be easily and quickly attached without altering the construction of the shoe in any particular. The tip extends half way up on the point of the toe, this being sufficient to protect the tip where it is most used. In use, these rubber shoe tips are said to be neat appearing and economical.

Current Crude Rubber Items

STEADY TONE SHOWN ON RUBBER EXCHANGE

Lower Prices at Close of Period Are Sequel to Factory Policy of Going Slow and Awaiting Developments From Accumulated Malayan Stocks.

FLUCTUATIONS of price on the rubber exchange of New York during the last fortnight were approximately the same as in the previous two weeks. Trading has been moderate with but three or four heavy days, and even lower prices at the end of the period did not seem to stimulate manufacturers to action. A recession to 19.00 on August 20 closed the two weeks, but there was no expectation of a further drop.

By virtue of the decline in visible stocks in the United States and the continued drop in the amount of rubber in London, it might have been expected that the market would show an upward trend. Such, however, has not been the case due to uncertainty prevailing with regard to the expected accumulations of rubber in the Malayan States by the end of October. This is variously estimated from 75,000 tons downward. Negligible accumulations have been shown by a census in Ceylon.

The present healthy condition of the rubber industry in America may reasonably tend to overcome the fears of Malayan overproduction. Factories in the United States are absorbing more crude rubber than ever before in their history and their products are valued at well over a half a billion dollars for the first six months of 1928. In view of these facts, it seems likely that the threatened dumping of the Far Eastern accumulations on the market may be absorbed with little difficulty.

Future positions have shown a tendency to decline, especially for deliveries in January, February and March of 1929, which dropped to 18.90 in the closing prices.

The table below indicates the daily fluctuations in prices on the Exchange and the daily volume of sales.

RADIO CORPORATION IS GIVEN LIBERIA LICENSE

The Federal Radio Commission on August 17 granted the application of the Radio Corporation of America for permission to establish and operate a commercial radio service between the United States and Liberia. This will not conflict in any way with the interests of the Firestone Tire & Rubber Company which now holds a license for the same purpose and plans a transmitting station at Akron.

Bernard M. Robinson, attorney for the Firestone company, read to the Commission a radiogram from C. D. B. King, president of Liberia, stating his government's position. "The Liberian government," said President King's message, "considers direct communication via wireless with the United States and Liberia of importance to its national interests and the continuance of the traditional friendship between the two countries."

DUTCH PLANTERS TRY DIVERSIFYING CROPS

Planters in the Dutch East Indies are now trying to diversify their production, according to the Rubber Cultur Miji, Amsterdam. They are being told not to rely solely upon their rubber crops, and palm oil planting is one of the substitutes being recommended.

Exports of crude rubber from the Netherland East Indies during the first six months of 1928 totaled only 123,314 long tons as against 132,496 last year, according to reports from Trade Commissioner Thomas C. Barringer, Batavia. Most of decrease in shipments occured in the smaller islands, plantations in Java, Madura and Sumatra East Coast reaching about the same figures as in 1927.

The latest estimate of the Rubber Handelsvereeniging of Batavia places the dry weight of Netherlands native rubber production during 1927 at 101,000 metric tons. First estimates from this source had figured the production at only 93,000 metric tons.

ANNUAL DINNER HELD BY MALAYAN PLANTERS

Members of the Incorporated Society of Planters of Malaya recently assembled in London for their fifth annual dinner. G. L. O'Hara Hickson presided, and A. H. Campbell, chairman of the London Stock Exchange, was the guest of honor.

Mr. Campbell spoke in favor of co-operation and a spirit of public service in the rubber industry and declared that the rubber market, whether restricted or free, should be a real market with the value of shares based on intrinsic merits. William Duncan, chairman of the Rubber Growers' Association, expressed the conviction that the future of rubber seemed more satisfactory now than for a long time past. He urged a search for new uses to which rubber may be put.

FRANCE SEEKS MARKET FOR COLONIES' RUBBER

According to Paris reports, France is looking for a market for the crude rubber produced in her African colonies and in Indo-China. Special tariff agreements to effect an exchange of American cotton for French rubber are being considered by the French Department of Commerce.

The production of French rubber is growing yearly, but the business of raising rubber trees to maturity is so expensive as to leave no funds for the encouragement of cotton planting.

France now buys her cotton chiefly from England, the Unted States and Egypt. Her government experts figure that in two years the French colonists will be producing more rubber than France requires and an outlet on the American market, with cotton as a possible interchange, appears as a profitable venture.

Memorial for Lord Stevenson

Four gold vases were recently presented to St. Paul's Cathedral, London, in memory of the late Lord Stevenson. Winston Churchill, Chancellor of the Exchequer, made the presentation in the presence of about 80 guests.

Lord Stevenson's friends and members of the Rubber Growers' Association have also established a scholarship bearing his name at Loretto School for sons of men who have played a considerable part in British public affairs.

Closing Prices on Rubber Exchange of New York, Inc.

FROM AUGUST 6 TO AUGUST 20, 1928

	Date	Spot	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Sales*
Aug.	6	19.50	19.40	19.40	19.50	19.50	19.40	19.30	19.30	19.30	19.30	19.40	19.40	19.40	225
	7	19.60	19.50	19.60	19.60	19.60	19.50	19.40	19.40	19.40	19.40	19.50	19.50	19.50	335
	8	19.70	19.70	19.70	19.70	19.70	19.60	19.50	19.50	19.50	19.50	19.50	19.50	19.60	589
	9	19.60	19.60	19.60	19.60	19.60	19.50	19.40	19.40	19.40	19.40	19.50	19.50	19.50	516
	10	19.50	19.50	19.50	19.50	19.50	19.40	19.20	19.30	19.30	19.30	19.40	19.40	19.40	136
	11	19.40	19.40	19.40	19.30	19.30	19.20	19.10	19.10	19.10	19.10	19.20	19.20	19.20	232
	13	19.30	19.30	19.30	19.30	19.30	19.30	19.10	19.20	19.20	19.20	19.20	19.20	19.20	129
	14	19.20	19.20	19.20	19.20	19.20	19.10	19.00	19.10	19.10	19.10	19.10	19.10	19.10	335
	15	19.40	19.40	19.40	19.40	19.40	19.30	19.20	19.20	19.20	19.20	19.30	19.30	19.30	259
	16	19.30	19.30	19.30	19.30	19.30	19.20	19.10	19.10	19.10	19.10	19.20	19.20	19.20	218
	17	19.30	19.20	19.20	19.20	19.20	19.10	19.00	19.10	19.00	19.10	19.10	19.20	19.20	528
	18	19.10	19.10	19.10	19.10	19.10	19.10	19.00	19.00	19.00	19.00	19.10	19.10	19.10	16
	20	19.00	19.00	19.00	19.10	19.10	19.10	18.90	18.90	18.90	19.00	19.00	19.10	19.10	157

*In lots of 2½ tons each

CATALPO!

Rubber News Around the World

RUBBER EXPORTS IN FIRST HALF DECLINE

Decrease Is Due to Lower Values of Automobile Casings and Falling Off in Amount of Solid Tires Sent to Other Countries.

EXPORTS of automotive rubber goods from the United States during the first six months of 1928 were valued at $20,813,769 as against a total of $22,426,099 for the first half of last year, according to Department of Commerce figures. This reduction was caused by a decline in the exports of automobile casings and solid tires. All other items, except miscellaneous casings and tubes, increased both in volume and value.

Exports of automobile casings dropped from a value of $17,945,302 during the first six months of 1927 to $16,560,617 in the like period of 1928. The inner tube exports, on the other hand, increased from 804,992 units, valued at $1,665,300 to 879,100 with a value of $1,879,670.

Solid tires exports for automobiles showed a marked decline but the export trade still remains well over $1,000,000 and was augmented by an increase in unit values from $30.77 to $36.32. Exports of miscellaneous casings and tubes fell off to the extent of 6 per cent.

Miscellaneous solid tire exports increased by 32 per cent., and exports of tire repair materials were 3 per cent. higher than a year ago.

Exports to United Kingdom Drop

A decline in the market for American rubber products in the United Kingdom was responsible in great part for the lower export figures. Last year Great Britain and Ireland were the chief market for these goods and absorbed exports to the amount of nearly $2,000,000, during the first half, but this year the total of six months' trade with these countries amounted only to $355,000. Argentina is now the foremost American foreign market.

ADVERTISING CAMPAIGN FOR FOOTWEAR MAKERS

A new advertising campaign similar to the drive made last year is being organized this year by the rubber footwear manufacturers of Great Britain in conjunction with the Rubber Growers' Association in which approximately $50,000 will be spent to popularize rubber "Wellingtons" for winter wear. The purpose of the campaign will be to give publicity to the advantages of this type of rubber footwear as a protection against wet and cold and as an economical means of protecting stockings and saving shoes.

A folder giving details of the proposed campaign is being circulated to more than 40,000 retailers and repairers. Last year a similar co-operative advertising drive was carried out with a resultant increase in the sales of this type of footwear.

RUBBER ROADWAYS ARE DISCUSSED IN COMMONS

The use of rubber paving blocks for roadway purposes came up for discussion in the British Parliament on July 31 when Sir Robert Thomas requested information as to the location of experimental stretches of road and the success of the experiments. His question, directed to the Minister of Transport, was with regard to the cost, durability, non-slipping qualities and sound-deadening properties of this type of road surfacing.

Colonel Wilfrid Ashley replied to the questioner by stating that there are such experimental stretches in Blackfriars and Kensington, but that sufficient time has not yet elapsed for conclusions to be drawn from the tests.

RUBBER FLOORING LAID AT CANADIAN EXHIBIT

The Rubber Growers' Association has installed 1,000 square yards of rubber flooring as a permanent exhibit in the Empire Marketing Board Section of the Canadian National Exhibition which opened August 24 at Toronto. This is the fiftieth consecutive exhibition of its kind held in the Canadian city.

The central design of this rubber floor is an intricate piece of work representing in modernist style the rays of the sun extending out into the various sections of the Empire Marketing Board Exhibit in the Government Pavilion. A comprehensive exhibit has been installed by the Rubber Growers' Association itself, which has been allotted a space of 1,200 square feet.

Sections of this exhibit will be devoted to sponge rubber upholstery, crepe soled footwear, rubber footwear and clothing, rubber road blocks, white line blocks, hard rubber trolley wheels, rubber lining for ball mills, pumps, valves and bearings, rubber hose and belting, and other uses of rubber.

LARGEST CALENDER IS BUILT FOR AUSTRALIA

What is claimed to be the world's largest rubber calender has recently been shipped to the new factory of the Rapson Tyre and Rubber Company of Austrailia at Launceston, Tasmania. Designed and built by Francis Shaw & Company, Ltd., Manchester, the machine weighs 100 tons and is of the four-roller type.

LONDON RUBBER FAIR IS SET FOR DECEMBER

Definite arrangements are now under way for the holding of the Rubber Fair in the New Horticultural Hall, Westminster, London, from December 4th to 8th. The floor space of the 120 by 150 ft. hall has been laid out so as to leave ample space for all exhibits, and positions are being rapidly taken by British manufacturers of rubber goods.

The Institution of the Rubber Industry has declined to co-operate in the presentation of this rubberwear exhibition on the ground that it is "a trade matter that does not come within the province of the Institution."

RUBBER GROWERS PLAN EDUCATIONAL LECTURES

In response to requests from schools and colleges for specimens and text books on rubber for lecture purposes, the Rubber Growers' Association is considering the appointment of a group of lecturers who will be available when required to deliver lectures upon the production, manufacture and use of rubber. A syllabus for these educational talks is being drawn up along the broadest lines and will include general, historical and technical information.

The lectures will be illustrated with lantern slides and with motion picture films according to facilities available.

SIX-DAY WEEK URGED FOR RUBBER GROWERS

As a means of reducing the amount of production of rubber, Maurice Maude, a director of six well-known rubber companies, has suggested a cessation of work on the plantations on Sundays. It has always been the custom for work to go on as usual on Sundays in the Federated Malay States.

Besides being a welcome change to both coolies and Europeans on the plantations, Mr. Maude believes that such action would result in a reduction of about 14 per cent in production. He has offered his suggestion to the Rubber Growers' Association for consideration.

Rubber Stocks in Ceylon

A census by the Rubber Growers' Association of rubber stocks held by Ceylon estates of more than 100 acres as of June 30th showed 5,000 tons on hand, with dealers' stocks at 4,300 tons. These figures include normal working stocks of estates and dealers, estimated at between 7,000 and 8,000 tons.

CATALPO!

MOTORCYCLE CENSUS SHOWS AN INCREASE

Registration of motorcycles throughout the world has increased 16 per cent, according to Department of Commerce figures announced by the American Motorists' Association. On January 1 of this year there were 1,944,303 motorcycles in operation as against 1,674,720 on January 1, 1927.

Great Britain and Germany, with approximately 500,000 each, have the largest registration. In the United States there are only 124,559 motorcycles registered.

The mid-summer sales conference of the Converse Rubber Shoe Company, held at the factory on August 13-14-15, was one of the most successful ever held by the company. All eastern salesmen, numbering about 40, were present and received their samples of the 1929 tennis line together with some new feature numbers in the rubber line. The conference was conducted by Morton L. Paterson, president of the company, who presided over a similar conference at the Chicago branch of the company the previous week.

Several hundred workers in the factory of the Firestone Tire & Rubber Company attended a company picnic August 11 at Brady Lake Park, Akron. The outing was for the employes of the Firestone 201 Calender Room and 217 A. & B. Department, Plant. Athletic contests and a baseball game were held under the supervision of a committee headed by Floyd Tifft and J. Lester.

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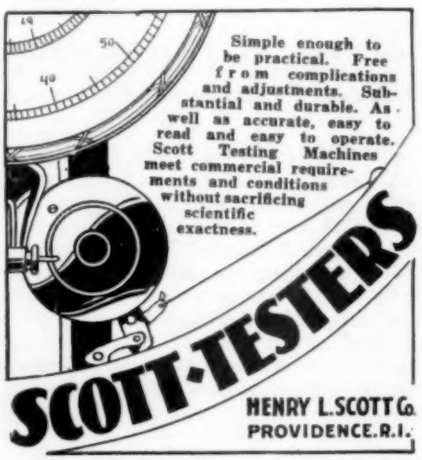
SITUATIONS WANTED

CRUDE RUBBER MAN with experience in Far East desires position with broker, dealer or manufacturer of rubber goods or allied lines. Capable of buying, selling, or passing on quality of purchases; also willing to travel. Box 492, THE RUBBER AGE.

MAN who has been very successful with labor saving devices and factory management with reputable rubber company for several years is open for new employment. Graduate mechanical engineer. Box 493, THE RUBBER AGE.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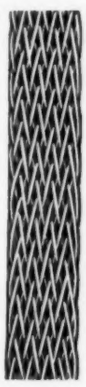

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LATE MARKET PRICES

Crude, Scrap & Reclaimed Rubber - Cottons and Fabrics

NEW YORK, AUGUST 21, 1928

COTTON

THE estimate of the cotton crop by the Crop Reporting Bureau of the Department of Agriculture on August 8, placing the year's yield at 14,291,000 bales, caused a temporary rise in the market which, however, was soon overcome. The Government figures were generally protested as being far too low and were discounted on the market. Improved crop conditions and the fear of a larger crop than needed were causes for a sharp decline.

More recently news from the South, carrying complaints of weevil activity and plant deterioration due to the continued hot weather, has served to steady the market. Announcement has been made that several mills which had closed down for the summer were reopening, and the downward price trend is expected to cause many of them to enter the market. Some predict, however, that this will not take place until a 15-cent level is reached.

High, low and closing quotations as of August 20 were as follows:

	High	Low Aug. 20	Close	Close Aug. 6
August	——	——	18.40	19.18
October	18.67	18.25	18.62	19.38

Tire Fabrics

The tire fabric market has held up fairly well during the last two weeks and under steady demand prices have not gone off in sympathy with raw cotton as in the case of other textiles. Demand from tire factories is indicative of the heavy production schedules which the tire manufacturers are still maintaining. Late prices follow:

CORD				
Peeler, carded, 23/5/3	lb.	.45	@	.46½
Peeler, carded, 23/4/3	lb.	.46	@	.47½
Peeler, carded, 13/3/3	lb.	.43	@	.44½
Peeler, carded, 15/3/3	lb.	.44	@	.45½
Egyptian, carded, 23/5/3	lb.	.54	@	.55
Egyptian, combed, 23/5/3	lb.	.59	@	.62
CHAFERS				
Carded, American, 8 oz.	lb.	.40	@	.41
Carded, American, 10 oz.	lb.	.40	@	.41
Carded, American, 12 oz.	lb.	.41	@	.43
Carded American, 14 oz.	lb.	.39	@	.43
LENO BREAKER				
Carded American, 8¼ oz.	lb.	.39	@	.43
Carded American, 10¼ oz.	lb.	.39	@	.43
SQUARE WOVEN				
Carded American, 17¼ oz. 23-11 ply	lb.	.45	@	.46
Carded American, 17¼ oz. 10-5 ply	lb.	.39	@	.40

Sheetings

There has been fair activity in sheetings during the last two weeks in view of the lower price levels which have come as a reflection of the drop in raw cotton prices. The 40-inch constructions in sheetings are reported to have been particularly active. Late prices follow:

40-inch, 2.50-yard	yd.	.12⅝	@	.12½
40-inch, 2.85-yard	yd.	.11	@	.11¼
40-inch, 3.15-yard	yd.	.12	@	.12¼
40-inch, 3.60 yard	yd.	.09⅛	@	.09¾
40-inch, 3.75-yard	yd.	.08⅞	@	.08⅞
40-inch, 4.25-yard	yd.	.07⅞	@	.07⅞

Ducks

The market in ducks has enjoyed a busy two weeks period and apparently the factories are again coming into the market in force. This renewal of buying has been expected and has been further stimulated by the reduction in price levels. Late quotations follow:

Belting and Hose	lb.	.33½	@	.35½
Enameling	lb.	.36	@	.41
Single filling	lb.	.16	@	.17
Double filling	lb.	.18	@	—

RECLAIMED RUBBER

The reclaimed rubber market within the last two weeks has shown no change either in the matter of prices or in the fairly steady demand which is continuing in spite of the steady and relatively low crude rubber market. One of the surprises of the industry has been the manner in which the reclaimed market has held up and the continuous demand in strong volume which it has enjoyed, indicating that the manufacturers were not yet ready to think of throwing over reclaimed and reverting to crude. Latest prices were as follows:

High Tensile				
Super-Reclaim No. 1 Black	lb.	.12½	@	.13
Super-Reclaim No. 2 Black	lb.	.11½	@	.11¾
High Tensile Red	lb.	.13½	@	.13¾
Shoe				
Unwashed	lb.	.07¼	@	.07½
Washed	lb.	.10	@	.10¼
Tube				
No. 1 (Floating)	lb.	.14½	@	.15
No. 2 (Compounded)	lb.	.11	@	.11½
Tires				
Black, washed		.09½	@	.10
Black, unwashed		.07¾	@	.08
Black selected tires	lb.	.08¼	@	.08½
Dark Gray	lb.	.09¾	@	.10
Light Gray	lb.	.12	@	.12½
White	lb.	.13	@	.13½
Truck, Heavy Gravity	lb.	.07¼	@	.07½
Truck, Light Gravity	lb.	.07¾	@	.08
Miscellaneous				
Mechanical Blends	lb.	.06⅞	@	.07½
Red	lb.	.13½	@	.13¾

Scrap Rubber

While the scrap market remained dull for the last fortnight prices have advanced slight due to the light accumulations and extremely low stocks in the hands of dealers and in the face of a steady demand from reclaimers. Dealers are reported to be offering slightly better prices as an inducement to further collections. Late prices follow:

(Prices to Consumer)

Auto tire peelings	ton	37.00	@	38.00
Standard White auto	ton	55.00	@	57.50
Mixed auto	ton	25.00	@	26.00
Bicycle tires	ton	25.00	@	27.50
Clean solid truck tires	ton	22.00	@	24.00
Boots and shoes	lb.	.01⅝	@	.01½
Arctics, trimmed	lb.	.00⅞	@	01
Arctics, untrimmed	lb.	.00⅝	@	.00⅞
Inner tubes, No. 1	lb.	.06⅝	@	.07
Inner tubes, No. 2, compounded		.04½	@	.04¾
Inner Tubes, Red	lb.	.05½	@	.05¾
Air Brake Hose	ton	35.00	@	37.50
Rubber Hose	ton	18.00	@	20.00

CRUDE RUBBER

THE crude rubber market has remained fairly steady around 19½ cents, although closing on August 20 at a figure slightly lower than two weeks ago. Prospects of record consumption held the market up, but the announcement of a July absorption of only 37,407 tons contributed to a decline toward the end of the period. Manufacturers, still remembering their tremendous inventory losses during the first half of the year, seem to be waiting for lower levels, although dealers on the outside market were down to 19⅜ as against a high of 20 cents only ten days earlier.

One striking feature in the physical rubber market has been the tightness in the off-grades. These grades are enjoying an excellent demand, and factories are said to be paying substantial premiums over standard ribs for the small weights that are available.

The decline in prices is unusual in view of the fact that London stocks of crude rubber during the last week showed an unexpectedly large drop of more than 1,000 tons to a figure lower than has been recorded at any time during the past two years. It has been estimated that at the present rate of decline London stocks may be down as low as 13,000 tons by November. While this is hardly likely, the possibility may have a steadying effect on the market in coming weeks.

The general disposition is to go slow for the time being, pending further developments, especially in the matter of the disposition of the accumulating stocks in the Far East.

Prices on the New York outside market on August 20 were as follows:

Plantations—			
Ribbed Smoked Sheets—			
Spot	.19¼	@	.19⅜
Aug.-Sept.	.19¼	@	.19⅜
Oct.-Dec.	.19⅛	@	.19⅜
First Latex, crepe spot	.19½	@	.19¾
Amber Crepe, No. 2	.20¼	@	.20¼
Amber Crepe, No. 3	.19½	@	.19¾
Amber Crepe, No. 4	.19	@	.19¼
Brown Crepe, Rolled	.19⅜	@	.19½
Brown Crepe, Clean, thin	.19½	@	.19⅝
Brown Crepe, specky	.19	@	.19¼
Liquid Latex, per gal.		@	1.50
Paras—			
Up-river Fine	.22	@	.22¼
Up-river Medium	Nominal		
Up-river Coarse	.14¼	@	.14½
Acre Bolivian, fine	.22¼	@	.22½
Caucho Ball, Upper	.12¾	@	.13¼
Islands, fine	.16	@	.16½
Centrals—			
Central, scrap	.15	@	.15½
Esmeraldas	.14¾	@	.15
Balata—			
Block, Colombia	Nominal		
Block, Cuidad	.38	@	.39

LONDON MARKET

Standard Ribbed Smoked Sheets—Buyers			
Spot-Aug.	9⅝	@	9½d
Spot	9½d		
Oct.-Dec.	9½	@	9⅝d

SINGAPORE MARKET

Standard Ribbed Smoked Sheets—Sellers			
Spot	8¾	@	8⅞d

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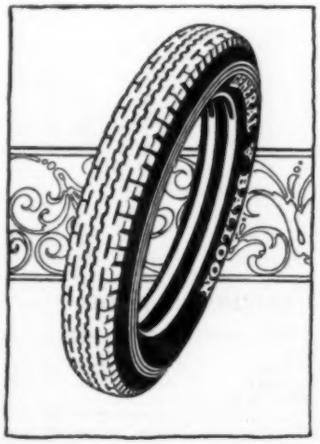

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LATE RUBBER CHEMICAL PRICES

Accelerators—Colors—Softeners—Compounding Materials

NEW YORK, AUGUST 21, 1928

SUPPLIERS of rubber chemicals and compounding materials continue to report a satisfactory demand coming from the rubber industry. Prices on chemicals have remained steady during the last fortnight, the only items showing a change being the Grasselerators, which receded to slightly lower levels and "Aerfloted" Arrow Black and "Aerfloted" Suprex Clay which advanced a half cent and a dollar, respectively. The rise in carbon black is due to the recently imposed tax by the state of Louisiana of approximately ¾ cents per pound on all black manufactured within the state.

Reports indicate that there is no slackening in the production schedules of the various tire manufacturing plants and that the August production may again break all records,—a condition which should be encouraging to the chemical trade.

ACCELERATORS

Organic			
A-7	lb.	.55 @	.59
A-11	lb.	.62 @	.66
A-16	lb.	.57 @	.61
A-19	lb.	.58 @	.62
A-20	lb.	.64 @	.68
Asro-X	lb.	.75 @	—
Aldehyde ammonia, crystals	lb.	.65 @	.70
Aniline oil, druma, f.o.b. works	lb.	.15 @	.16¼
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolylguanidine	lb.	.48 @	.50½
Diphenylguanidine	lb.	.40 @	.42½
Ethylidene aniline	lb.	.45 @	.47½
Formaldehyde Aniline, 140° m. p.	lb.	.33 @	.35½
Formaldehyde Aniline, 60° m. p.	lb.	.31 @	.33½
Grasselerator 102	lb.	.58½@	.61
Grasselerator 552	lb.	— @	4.45
Grasselerator 808	lb.	.79 @	.85
Grasselerator 833	lb.	1.17 @	1.30
Heptene	lb.	.45 @	.55
Hexamethylene-tetramine	lb.	.57½@	.60
Lithex	lb.	.18 @	.20
Methylenedianilide	lb.	.36 @	.37
Monex	lb.	3.25 @	—
Oynone	lb.	.68 @	.80
Para-Nitrosodimethylaniline, f.o.b. works	lb.	.92 @	.96
Piperidine-Piperidyldithio-Carbamate	lb.	4.45 @	4.60
R & H 40	lb.	.40 @	.42½
R & H 50	lb.	.40 @	.42½
R & H 397	lb.	.75 @	.77½
Safex	lb.	1.20 @	1.25
Tensilac, No. 39	lb.	.50 @	.52½
Tensilac, No. 41	lb.	.50 @	.52½
Thermlo F	lb.	.50 @	.55
Thiocarbanilide, drums	lb.	.25½@	.26½
Thionex	lb.	3.25 @	—
Trimene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.65 @	.70
Vulcanex	lb.	.68 @	—
Vulcone	lb.	.68 @	—
Vulcanol	lb.	1.03 @	1.08
Waxene	lb.	.30 @	.32
Z 88	lb.	.65 @	.69
Inorganic			
Lead, sublimed blue	lb.	.08¼@	.08¾
Lead, white	lb.	.10½@	.12½
Litharge, domestic	lb.	.09½@	.12
Magnesia, calcined,			
light	per 100 lb.	5.35 @	5.45
heavy	per 100 lb.	3.65 @	3.75

COLORS

Blacks (See Compounding Materials)			
Blues			
Prussian	lb.	.33 @	.35
Ultramarine	lb.	.06 @	.30
Browns			
Sienna, Italian	lb.	.05 @	.12½
Umber, Turkey	lb.	.04½@	.07
Greens			
Chrome, light	lb.	.27 @	.31
medium	lb.	.29 @	.32
dark	lb.	.31 @	.34
Chromium Oxide, bbl.	lb.	.34 @	.36
Reds			
Antimony			
crimson, 15/17	lb.	.44 @	.50
sulphur free	lb.	.50 @	.55
golden 15/17 F.S.	lb.	.18 @	.22
Indian English	lb.	.08 @	.12
Domestic (Maroon)	lb.	.08 @	.12
Oximony	lb.	.18¼@	—
Red oxide, pure'	lb.	.10 @	.12
Venetian red	lb.	.03 @	.06
Vermillion, quicksilver, English	lb.	1.85 @	1.95
Whites			
Lithophone, Akcolith	lb.	.05 3/5@	.06
Lithophone, Azolith	lb.	.06¼@	.06¾
Lithopone, Vanolith	lb.	.05¾@	—
Titanox	lb.	.10 @	.10½
Cal. Base Pigment	lb.	.10 @	.10½
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.06½@	.07
ZZ (leaded)	lb.	.06⅞@	.07⅛
Zinc Oxide—French Process			
White seal	lb.	.11⅞@	—
Green seal	lb.	.10⅞@	—
Red Seal		.09⅞@	—
Yellows			
Chrome	lb.	.15½@	.16½
Ocher, French medium	lb.	.03½@	.06
domestic	lb.	.01⅝@	.02

COMPOUNDING MATERIALS

Aluminum Flake	ton	21.85 @	24.50
Ammonia carbonate	lb.	.10½@	.12
Asbestine	ton	14.75 @	18.00
Barium carbonate	lb.	.03½@	.05
Barium Dust	lb.	.05 @	.06
Barytes southern off-color,	ton	12.00 @	18.00
Western prime white	ton	23.00 @	—
imported	ton	27.00 @	36.00
Basofor	lb.	.04½@	—
Blacks			
Arrow "Aerfloted"	lb.	.08½@	.12½
Bone Black	lb.	.05½@	.11
Carbon, compressed	lb.	.08 @	.12
Carbon, uncompressed	lb.	.07½@	.11½
Drop Black	lb.	.06 @	.10
Fumonex	lb.	.06 @	.09
Gastex	lb.	.05¼@	.05½
Lamp Black	lb.	.12 @	.40
Micronex	lb.	.08½@	.12½
Velvetex carbon	lb.	.04½@	.06
Blanc fixe dry f.o.b. works	lb.	.03½@	.03⅝
Carrara filler	lb.	.01¾@	.02
Catalpo (fact.)	lb.	.02 @	—
Chalk	ton	12.00 @	14.00
Clay, China, domestic	ton	8.00 @	9.00
Aerfloted Suprex	ton	10.00 @	22.00
Congaree, c. l. f.o.b. mine	ton	9.00 @	—
Mineral Flour, c. l. fob mine	ton	20.00 @	23.00
Tensulite		15.00 @	—
Glues, extra white	lb.	.22 @	.26
medium white	lb.	.20 @	.24
Magnesia, carbonate	lb.	.08¾@	.11
Mica, powdered	ton	65.00 @	80.00
Rotten Stone (powdered)	lb.	.02½@	.04½
Soapstone, powdered	ton	15.00 @	22.00
Starch, powdered	cwt.	3.30 @	3.70
Talc, domestic	ton	12.00 @	15.00
Velvetex	lb.	.04 @	.07
Whiting, commercial	cwt.	.85 @	1.00
English cliffstone	cwt.	1.50 @	—
Superfine	ton	10.00 @	12.00
Witco	ton	12.00 @	—
Wood pulp XXX	ton	45.00 @	—
Wood pulp X	ton	25.00 @	—
Zinc Carbonate	lb.	.09½@	.10½
Zinc Stearate	lb.	.18½@	.19½

MINERAL RUBBER

Genasco (factory)	ton	50.00 @	52.00
Montezuma, solid	ton	28.00 @	36.00
Montezuma, granulated	ton	32.00 @	42.00
Paradura	ton	62.50 @	65.00
Pioneer, MR, solid	ton	42.00 @	45.00
Pioneer-granulated	ton	52.00 @	55.00
R & H Hydro-Carbon	ton	27.05 @	29.00
Robertson, MR, solid	ton	24.00 @	30.00
M.R. (gran)	ton	38.00 @	80.00

SOFTENERS

Acids			
Nitric, 36 degrees	cwt.	5.00 @	5.25
Sulphuric, 60 degrees	ton	10.50 @	11.50
66 degrees	ton	15.00 @	16.00
Tartaric, crystals	lb.	.35 @	.36
Acids, Fatty			
Stearex	lb.	.11 @	.15
Stearic, double pressed	lb.	.11½@	.12½
Alkalies			
Caustic soda, 76%	cwt.	3.76 @	3.91
Soda ash, 58% C.L.	cwt.	1.40 @	
Oils			
Corn, refined, bbls.	lb.	.11 @	.11½
Cottonseed, crude		.08½@	.08¾
Cycline	gal.	.27 @	.34
Degras (c.l. 100 bbls.)	lb.	.03¾@	—
Less c. l. (10-25 bbls.)	lb.	.04 @	—
Lots less than 10 bbls.	lb.	.04¼@	.04½
Fluxrite	lb.	.05 @	.06
Hexalin	lb.	.60 @	—
Acetate	lb.	.70 @	—
Linseed, Raw C.L. bbl.	lb.	.09½@	.10
Palm Lagos	lb.	.07¼@	.07½
Niger	lb.	.07¾@	.08
Vansulol	lb.	.10½@	—
Para-Flux	gal.	.17 @	—
Peanut, domestic, crude	lb.	.12 @	.12¼
Petrolatum, white	lb.	.08 @	.08½
dark amber	lb.	.03⅜@	.03⅝
Pine, steam distilled	lb.	.70 @	
Rapeseed, refined	gal.	1.04 @	1.06
second rectified	gal.	.58 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.06½@	.07½
coal tar	gal.	.05½@	.06
pine, 200 lb. gr. wt.	bbl.	9.00 @	10.00
Rosin, grade K, 280 lb.	bbl.	8.55 @	—
Pigmentar	gal.	.33 @	.41
Tar Retort, 50 gal.	bbl.	12.50 @	13.00
Solvents			
Acetone, pure	lb.	.13 @	
Alcohol denatured, No. 1 bbls.	gal.	.37½@	.44½
Benzol, 90%	gal.	.28 @	—
Carbon bisulphide	lb.	.05½@	.06¼
Carbon tetrachloride	lb.	.06¼@	.07
Motor gasoline, steel bbls.	gal.	.17 @	—
Naptha, solvent	gal.	.35 @	.40
Turpentine, spirits	gal.	.60 @	.64
wood	gal.	.50 @	.54
Waxes			
Beeswax	lb.	.56 @	.58
Carnauba	lb.	@	.50
Ceresin, white	lb.	.10 @	.11
Montan, crude	lb.	.07 @	.07½
Ozokerite, black	lb.	.24 @	.25
green	lb.	.26 @	.30
Miscellaneous			
RSL Mold Solution	gal.	.75 @	1.00

ANTI-OXIDANTS

Antox	lb.	.79 @	.83
Neozone	lb.	.74 @	—
Oxynone	lb.	.68 @	.80
Resistox	lb.	.54 @	.57
Stabilite	lb.	.65 @	—
VGB	lb.	.55 @	.66

SUBSTITUTES

Black	lb.	.08 @	.14
White	lb.	.10 @	.16
Brown	lb.	.08 @	.15

VULCANIZING INGREDIENTS

Sulphur Chloride (drums)	lb.	.03¼@	.03½
Sulphur flour,			
Superfine bags	cwt.	2.20 @	2.80
Superfine, bbls.	cwt.	2.55 @	3.10
100% pure, refined,			
bags	cwt.	2.60 @	3.15
bbls.	cwt.	2.95 @	3.50

TIRES & TUBES
CRUDE RUBBER

STATISTICAL SECTION

AUTOMOBILES
GASOLINE

FAILURE of other factories to keep pace with those producing automotive rubber products kept July from being a record breaking month for consumption of crude rubber. Nevertheless, predictions are still being made that August may see a new peak in the use of rubber, and stocks on hand are steadily declining.

Imports of rubber, according to official estimates, may be as high or higher for July than for June, but still the amount brought into the country is far below the total being absorbed by the industry. The amount of rubber invoiced to the United States is showing some gains, the figures for the week ending August 11 being the highest in the past three months.

Expectations of a steady market around 19½ cents have been realized and little change seems destined to occur until the fall. The effect of British restrictions appears to be to keep the price down rather than to let it follow the upward trend that might naturally be expected with American stocks showing a record decline and London stocks at their lowest point in the last two years.

Stocks at Singapore and Penang continue to rise and, while not yet approaching the figures of last spring and winter, are being carefully watched as indications of the expected accumulations that may be released in November.

Announcements of increased motor car production by Ford and other factories can not fail to keep the rubber manufacturers working at full capacity, and figures for the end of August may show the United States with a bare two months' supply of rubber on hand.

PLAN OF THE SECTION

The statistics included in this section have been chosen for their constant importance to the rubber industry. The tables are reprinted in the same relative position in every issue, each table being kept current by the addition of new figures as soon as they become available. The section accordingly affords the most up-to-date, complete and convenient statistical service in the industry.

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U. S. Imports and Exports of Crude Rubber

	Gross Imports			Re-exports			Net Imports
YEARS	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons
1921	185,394	73,772,677	17.76	5,716	2,414,924	18.86	179,678
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,144	185,060,304	26.72	8,772	5,672,319	28.87	300,372
1924	328,056	174,231,331	23.71	10,309	6,057,637	26.23	317,747
1925	396,642	429,705,014	48.36	14,827	19,847,753	59.76	381,815
1926	413,338	505,817,807	54.63	17,671	22,470,583	56.77	395,667
1927	426,258	339,874,774	35.60	27,775	24,735,488	39.76	398,483
1926:							
Jan.	42,404	72,528,151	76.36	2,059	3,747,505	81.24	40,345
Feb.	32,865	58,733,370	79.78	1,430	2,280,168	71.17	31,435
Mar.	42,152	70,589,581	74.76	1,836	2,735,234	66.51	40,316
Apr.	34,544	48,742,539	62.99	1,128	1,605,093	63.58	33,416
May	29,756	36,896,080	55.35	1,052	1,558,987	66.17	28,704
June	24,900	34,498,561	61.85	1,105	1,371,217	55.41	23,795
July	35,820	33,061,281	41.20	1,554	1,743,854	50.09	34,266
Aug.	27,400	24,670,752	40.21	1,318	1,339,563	45.38	26,082
Sept.	37,112	32,625,032	39.25	1,437	1,519,870	47.20	35,675
Oct.	29,746	25,320,558	38.49	1,366	1,316,270	43.03	28,110
Nov.	39,155	34,890,536	39.78	1,482	1,411,517	42.51	37,673
Dec.	37,754	33,261,366	39.33	1,904	1,841,305	43.16	35,850
1927:							
Jan.	43,340	36,753,719	37.86	1,525	1,444,734	42.28	41,815
Feb.	28,337	23,110,257	36.41	2,451	2,277,297	41.47	25,886
Mar.	35,515	28,693,016	36.07	2,763	3,249,665	52.50	32,752
Apr.	46,202	37,321,505	36.06	1,575	1,428,425	40.48	44,627
May	36,518	30,984,377	37.88	2,782	2,501,562	40.14	33,736
June	33,045	27,850,014	37.62	1,775	1,550,592	39.00	31,270
July	37,677	31,678,259	37.53	1,958	1,560,853	35.59	35,719
Aug.	32,810	26,396,931	35.92	1,809	1,382,768	34.12	31,001
Sept.	33,301	25,314,412	33.94	3,500	3,036,929	38.74	29,801
Oct.	30,184	22,163,282	32.78	2,513	2,042,713	36.29	27,671
Nov.	38,592	27,395,428	31.69	2,469	2,014,196	36.43	36,123
Dec.	30,737	22,213,574	32.26	2,655	2,245,754	37.77	28,082
1928:							
Jan.	39,108	30,278,444	34.56	1,988	1,734,990	38.95	37,120
Feb.	33,664	27,763,655	36.82	2,738	2,229,589	36.35	30,926
Mar.	40,688	32,109,376	35.23	3,718	2,587,434	31.07	36,950
Apr.	37,958	27,296,346	32.23	2,272	1,415,024	27.80	35,686
May	31,058	19,058,672	27.80	2,399	1,386,807	25.80	28,659
June	27,764	14,121,219	22.71	2,621	1,400,697	23.86	25,143
July*	27,129	11,581,969	19.06				
Aug.							
Sept.							
Oct.							
Nov.							
Dec.							

*Official estimates based on arrivals at New York and Boston.

U. S. Consumption of Crude Rubber

(Rubber Association of America statistics raised to 100 per cent—All figures in long tons)

Figures on Monthly Basis

	1921	1922	1923	1924	1925	1926	1927	1928
Jan.	5,045	16,938	30,106	29,058	29,638	32,196	31,518	34,403
Feb.	5,955	14,767	30,149	25,736	29,761	31,136	30,137	33,702
Mar.	9,190	21,408	36,629	28,385	33,498	32,936	36,141	35,688
Apr.	13,084	19,294	29,085	27,129	34,139	32,696	35,871	32,772
May	16,023	23,246	36,155	25,845	35,322	29,364	34,592	37,333
June	16,142	31,713	24,272	22,753	35,822	28,598	33,801	37,676
July	18,310	24,522	17,685	23,396	36,053	27,577	29,219	37,407
Aug.	23,649	29,361	20,359	28,982	35,909	34,533	33,460	
Sept.	16,705	24,410	17,594	31,497	31,691	32,904	27,214	
Oct.	16,814	26,881	21,321	31,520	29,047	29,836	26,790	
Nov.	14,105	24,950	20,437	27,289	28,853	28,080	26,792	
Dec.	15,482	25,070	21,902	27,199	28,748	26,293	25,492	
Totals	170,504	282,560	305,694	328,769	388,481	366,149	371,027	

Figures on Quarterly Basis

Quarter	1921	1922	1923	1924	1925	1926	1927	1928
Jan./Mar.			96,776	87,609	95,263	94,301	99,216	103,558
Apr./June	65,463	127,360	89,493	75,674	104,099	87,109	103,242	103,500
July/Sept.			55,621	83,813	99,493	93,793	89,210	
Oct./Dec.	105,962	155,067	63,617	92,656	85,789	83,212	80,860	
Totals	171,425	282,427	305,507	339,752	384,644	358,415	372,528	207,058

Note—The Rubber Association estimates its monthly rubber consumption figures to be 90 per cent complete. Up until 1925 the quarterly figures were likewise estimated to be 90 per cent complete; beginning with 1925 an estimate of 92 per cent completeness has been used. These estimates have been used in raising the figures in this table to 100 per cent. The quarterly figures are generally regarded as the most authentic; the monthly figures may be accepted as preliminary.

Rubber Invoiced to the U. S.

(Reported by American Consuls—Quantities in Long Tons)

During the Week Ended	From Br. Malaya	From Ceylon	From Dutch East Indies	From London & Liverpool	Total
June 16	3,335	326	1,652	1,020	6,333
June 23	3,787	266	1,708	2,270	8,031
June 30	4,797	1,094	1,670	821	8,382
July 7	5,231	899	1,601	842	8,573
July 14	4,403	859	2,249	277	7,788
July 21	4,879	384	1,648	320	7,231
July 28	4,685	1,065	2,083	178	8,011
Aug. 4	4,271	692	1,335	1,582	7,880
Aug. 11	4,916	740	2,373	916	8,945
Aug. 18	6,416	776	1,813	944	9,949

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1925																																
November	—	99⅜	—	98⅝	98¼	100	100¾	—	98¼	99½	100½	101¼	104½	105½	—	99¼	100	100	109¾	110¾	110½	110½	110½	106¼	—	108¾	108¾	—	—	—	—	104⅝
December	106¾	105½	107¾	107¼	108¾	—	108	109	109¾	106	105½	105½	—	101		99¼	90¼	93	88¾	86¾	—	85¾	88¾	88¾	—	93	91	91¾	91¾	98½		
1926																																
January	—	67	—	87	87¾	85½	86½	87½	87¾	—	88¾	88¾	88¾	88¾	85½	84½	82½	75½	75½	75½	75	72	72½	68	66½	67	69¾	70½	69	—	79½	
February	67	67½	66¾	66¾	68	69	—	—	65	65	66	66	65½	65½	—	60	60½	60	59	61	—	—	56	55	52	51¾	51	51	—	—	62¾	
March	56	58	58	53½	59	57½	56	56	55½	61	60	63	61½	60½	62	60½	61	62	61	61	61½	61	60	60	60	59¾	59½	58	—	59	
April	59	—	59	59	59	56½	56½	53	53	53	49	51½	50½	49¼	47½	48½	47	47	47½	45½	48	49	48	48	48	48	48	49	—	53½	51¼	
May	48½	—	50	50¼	49¾	49¾	49¾	49½	—	43	49¾	48	48½	47¾	47¾	43	43	47½	47½	47½	47	46¾	46	45	46	45	45	45	42	—	47¾	
June	41½	42	41½	42	41¼	41½	42	41½	41½	41½	42	41½	41½	41½	41½	41½	40	41½	41½	41½	44	44	43½	43½	43	42	41½	41	42	39¾	42½	
July	42	42	42	42	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41	41½	41½	41½	39	39	41	41	39½	39½	
August	—	88½	88¼	—	87	88¼	89	—	40¼	37½	37½	37½	37½	37½	40¼	40¼	38	38	40½	39	39	39½	39½	39	42¼	42½	42½	42½	42½	40	41	
September	40¼	40¼	40¼	—	—	40¼	—	—	40¼	40¼	40¼	40¼	40¼	40¼	40¼	40¼	40½	40½	42½	42½	42½	41½	42½	42½	42½	42½	42½	42½	42½	—	—	42½	
October	43	43	—	43¼	42¾	42½	—	—	42½	42½	42¾	42¾	42¾	42¾	43¼	43¼	43¼	43¼	43¼	43¼	43¼	43¼	43¼	43¼	43¼	43¼	43¼	43¼	43¼	—	—	43¼	
November	41¼	—	41	41½	41½	41½	—	—	41½	41½	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	
December	36¾	37½	37½	37½	37½	37½	37	37	37½	37	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	
1927																																
January	—	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾
February	87¾	87¾	87¾	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½
March	89¾	89¾	89¾	89	89	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾	89¾
April	41¾	41¾	41¾	41	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼
May	—	40½	40¾	40½	41	41	40¾	40¾	—	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾
June	40¾	40¾	40¾	40¾	39¾	39¾	39¾	39¾	88¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾	87¾
July	—	85½	—	85¾	84¾	84¾	84¾	84¾	84¾	84¾	84¾	84¾	84¾	84¾	84½	84½	84½	84½	84½	84½	84½	84½	84½	84½	84½	84½	84½	84½	84½	84½	84½	84½
August	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½	85½
Sept.	84	83¾	—	83¾	83½	83½	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾
Oct.	83¾	—	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾	83¾
Nov.	85	85¾	85¾	85¾	86¾	86¾	86¾	86¾	87	—	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87
Dec.	40½	40½	40½	40½	40¾	—	40¾	40	40	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½
1928																																
January	—	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½	87½
February	29	28¾	28¾	27¾	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½
March	—	27¾	27¾	27½	21¼	21½	21¼	—	—	20	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾
April	17½	17¾	18¾	19¾	19¾	19¾	19¾	18¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾
May	19¾	19¾	18¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾
June	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½
July	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
August	—	19½	19½	19¾	19¾	19¾	19¾	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1921

Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15
1911	141.30	1915	65.85	1919	48.70
1912	121.60	1916	72.50	1920	36.30
1913	82.04	1917	72.23	1921	16.36

Average Monthly Price per Pound Since 1922

Months	1922 Cents	1923 Cents	1924 Cents	1925 Cents	1926 Cents	1927 Cents	1928 Cents
Jan.	18.82	32.73	25.86	36.71	79.50	38.75	40.25
Feb.	16.12	35.14	25.29	36.01	62.25	38.25	32.75
Mar.	14.53	34.21	22.83	41.00	59.00	41.04	26.82
Apr.	15.99	32.48	22.51	43.64	51.25	40.86	18.97
May	15.25	27.39	18.89	58.47	47.75	40.76	18.99
June	15.11	26.88	18.81	77.26	42.50	37.25	19.59
July	14.67	26.10	22.16	103.16	41.03	23.44	19.40
Aug.	**13.93**	**28.34**	**26.17**	**82.99**	**38.50**	**35.12**	
Sept.	14.44	28.95	27.56	88.88	41.00	33.67	
Oct.	19.78	26.93	31.13	98.01	42.50	34.32	
Nov.	23.88	27.14	34.33	104.80	38.50	37.58	
Dec.	27.42	26.60	37.88	98.51	38.25	40.63	
Average for Year	17.50	29.45	26.20	72.46	48.50	37.72	

London Closing Prices of Ribbed Smoked Sheet

(In Pence Per Pound)

Sixth Restriction Year—Third Quarter

Day	Aug.	Sept.	Oct.	Day	Aug.	Sept.	Oct.
1	9⅜	—	—	17	9½	—	—
2	9⅜	—	—	18	9½	—	—
3	9½	—	—	19	—	—	—
4	—	—	—	20	9⅜	—	—
5	—	—	—	21	—	—	—
6	—	—	—	22	—	—	—
7	9½	—	—	23	—	—	—
8	9½	—	—	24	—	—	—
9	9½	—	—	25	—	—	—
10	9½	—	—	26	—	—	—
11	9½	—	—	27	—	—	—
12	—	—	—	28	—	—	—
13	9½	—	—	29	—	—	—
14	9½	—	—	30	—	—	—
15	9⅜	—	—	31	—	—	—
16	9½	—	—				

The average price for the period for which the daily prices are reported above is approximately 9.467 pence. All restrictions on rubber exports from British Malaya and Ceylon will officially cease on October 31.

Average Price in Previous Quarters

Quarter	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28
Nov.-Jan.	14.285	14.175	17.9983	46.709	19.265	19.023
Feb.-Apr.	16.858	12.917	19.356	28.103	19.696	12.591
May-July	14.242	10.947	38.469	21.001	18.165	
Aug.-Oct.	14.944	14.632	43.269	20.199	16.620	

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Day of Month	July	Aug.	Day of Month	July	Aug.	Day of Month	July	Aug.
1	——	19.90	11	22.25	18.90	21	21.10	——
2	22.80	19.70	12	22.20	——	22	——	——
3	22.35	19.85	13	21.95	18.55	23	21.05	——
4	——	19.95	14	22.00	18.95	24	20.90	——
5	22.75	——	15	——	19.20	25	21.10	——
6	22.85	19.65	16	21.60	19.35	26	21.15	——
7	22.75	19.65	17	21.50	19.10	27	21.05	——
8	——	20.40	18	21.70	19.10	28	21.05	——
9	21.95	18.95	19	21.55	——	29	——	——
10	22.20	19.30	20	21.20	18.85	30	20.95	——
						31	20.45	——

Average Monthly Price Per Pound

Month	1926 Cents	1927 Cents	1928 Cents	Month	1926 Cents	1927 Cents	1928 Cents
Jan.	20.85	13.42	19.12	Aug.	18.57	20.04	
Feb.	20.60	14.10	18.40	Sept.	17.02	21.95	
Mar.	19.35	14.32	19.38	Oct.	13.14	20.55	
Apr.	19.13	14.75	20.63	Nov.	12.86	20.22	
May	18.92	16.07	21.58	Dec.	12.68	19.58	
June	18.57	16.85	21.50	Average for Year	17.53	17.49	
July	18.71	18.00	21.36				

Stock of Crude Rubber in the U. S.

(All Quantities in Long Tons)

At	ON HAND			AFLOAT			ON HAND AND AFLOAT		
End of	1926	1927	1928	1926	1927	1928	1926	1927	1928
Jan.	55,198	76,172	110,244	46,296	45,312	41,256	100,434	121,484	151,500
Feb.	58,035	91,186	108,955	46,935	42,166	43,316	104,970	133,352	152,271
March	61,822	85,740	114,061	43,567	49,600	39,324	105,389	135,340	153,385
April	55,261	92,757	113,083	41,905	38,963	33,986	97,166	131,720	147,069
May	64,360	94,563	105,356	40,303	44,181	34,374	104,663	138,744	139,730
June	60,460	89,250	90,198	40,907	47,233	40,001	101,367	136,483	130,119
July	64,900	98,469	83,242	38,062	40,587	42,304	102,962	139,056	125,546
Aug.	60,870	96,148		37,360	40,937		98,230	137,085	
Sept.	62,078	97,829		42,464	37,966		105,542	135,793	
Oct.	64,089	97,452		52,930	42,804		117,919	140,256	
Nov.	69,385	101,034		47,311	37,076		116,696	138,110	
Dec.	72,520	100,130		52,020	47,938		124,540	148,068	

(Rubber Association of America figures raised to 100%.)

Stock of Crude Rubber in London

(No. of tons in Wharves and Warehouses, including Latex)

At end of:	1920	1921	1922	1923	1924	1925	1926	1927	1928
Jan.	19,300	56,573	67,252	73,498	57,460	27,172	9,994	54,994	66,524
Feb.	18,329	59,439	67,623	70,483	56,732	23,425	10,004	58,826	62,964
Mar.	18,969	63,913	66,670	63,438	55,647	18,104	13,127	63,055	58,272
Apr.	20,072	68,759	68,637	58,770	54,559	12,949	18,773	66,897	53,425
May	20,921	70,403	70,146	54,439	51,615	5,895	20,384	67,169	
June	22,517	69,408	71,597	51,050	51,115	5,318	23,984	63,902	
July	25,346	71,065	71,515	49,937	52,073	4,258	27,727	63,717	
Aug.	30,674	73,211	72,112	58,427	49,700	4,619	30,165	64,491	
Sept.	35,504	72,175	70,977	54,523	44,011	5,453	35,077	68,236	
Oct.	41,743	69,229	68,536	58,891	37,523	5,086	42,138	69,569	
Nov.	45,550	70,786	68,548	60,074	33,593	3,869	44,057	67,050	
Dec.	50,652	69,792	72,299	60,246	29,488	5,697	48,918	63,793	

At End of Recent Weeks

	First Saturday	Second Saturday	Third Saturday	Fourth Saturday	Fifth Saturday
1927					
September	65,162	66,148	66,664	67,253	———
October	68,519	70,167	70,916	70,060	69,551
November	69,660	69,501	69,850	67,318	———
December	65,869	66,011	64,761	63,397	63,207
1928					
January	64,360	65,524	65,450	66,285	———
February	65,909	64,945	63,769	63,103	———
March	61,978	61,920	61,033	59,644	58,197
April	58,732	58,945	56,819	53,360	———
May	52,015	50,337	48,705	44,628	———
June	43,716	42,683	41,185	40,083	38,611
July	36,915	35,925	35,238	35,445	———
August	34,294	33,649	32,591	———	———

Rubber in Singapore and Penang

(Stocks held by Dealers—Quantities in Long Tons)

End of	1926	1927	1928	End of	1926	1927	1928
Jan.	16,726	25,440	25,868	July	23,101	22,558	18,663
Feb.	18,653	26,766	22,867	Aug.	23,362	25,764	
Mar.	18,389	27,844	20,538	Sept.	25,997	25,178	
Apr.	16,328	24,543	16,946	Oct.	26,614	25,790	
May	16,967	25,133	17,437	Nov.	25,486	28,369	
June	19,416	21,898	18,207	Dec.	26,443	25,798	

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total	Per Cent Balloons		Total	Per Cent Balloons
1922	16,297,735	0.0	1925	26,001,664	66.8
1923	23,140,620	0.6	1926	24,199,524	78.8
1924	21,863,311	19.7	1927	19,700,003	79.1
1928			1928		
January	1,811,534	87.8	July	2,209,692	85.9
February	1,806,437	86.5	August	———	—
March	2,420,084	86.4	September	———	—
April	2,316,324	88.4	October	———	—
May	2,185,592	84.0	November	———	—
June	2,429,453	83.1	December	———	—

U. S. Consumption of Gasoline

(In Barrels of 42 Gallons)

MONTHS	1924	1925	1926	1927	1928
January	11,918,000	14,386,000	17,582,000	17,888,000	20,939,000
February	9,626,000	13,210,000	15,814,000	18,240,000	21,136,000
March	10,961,000	14,890,000	19,302,000	22,464,000	24,041,000
April	14,583,000	19,013,000	20,848,000	23,371,000	25,712,000
May	15,889,000	20,459,000	24,213,000	26,579,000	27,355,000
June	16,421,000	20,724,000	23,803,000	27,799,000	29,022,000
July	18,610,000	22,879,000	24,752,000	29,784,000	
August	19,825,000	22,323,000	26,912,000	29,779,000	
September	16,871,000	20,177,000	22,929,000	28,409,000	
October	18,029,000	19,826,000	23,973,000	25,497,000	
November	16,607,000	18,024,000	20,618,000	24,400,000	
December	15,663,000	17,954,000	21,419,000	23,718,000	
TOTAL	185,003,000	223,865,000	262,165,000	297,928,000	

U. S. Tire and Tube Statistics

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1922	1923	1924	1925	1926	1927
Production	40,932	45,259	51,633	60,845	61,237	64,439
Shipments	39,987	45,204	50,120	59,262	59,002	64,059
Inventory[2]	6,132	5,772	7,427	8,142	10,456	10,264

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1926	1927	1928	1926	1927	1928	1926	1927	1928
Jan.	4,587	4,965	5,491	2,974	4,932	5,394	9,947	10,432	9,949
Feb.	4,865	5,095	6,363	3,436	4,458	5,031	11,164	11,075	11,721
Mar.	5,456	6,276	6,819	4,561	5,701	5,731	12,004	11,583	12,389
Apr.	5,346	6,299	6,178	4,980	5,701	5,812	12,461	12,122	12,717
May	5,023	6,151	6,759	5,211	5,657	6,457	12,343	12,462	13,024
June	5,422	6,202	6,692	5,724	6,253	7,117	11,968	12,462	12,162
July	4,950	5,087		6,337	5,973		10,592	11,326	
Aug.	5,872	5,752		6,744	6,393		9,732	10,721	
Sept.	5,706	4,822		6,040	5,717		9,318	9,722	
Oct.	5,103	4,773		4,544	4,799		9,917	9,665	
Nov.	4,324	4,502		3,733	4,306		10,297	10,136	
Dec.	4,683	4,497		4,718	4,165		10,456	10,264	

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1922	1923	1924	1925	1926	1927
Production	50,850	60,116	70,706	82,614	76,618	70,823
Shipments	49,673	59,072	68,016	81,004	71,591	72,896
Inventory[2]	7,643	8,425	11,052	11,313	16,200	13,692

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1926	1927	1928	1926	1927	1928	1926	1927	1928
Jan.	6,809	5,337	5,441	3,723	6,016	6,072	14,361	15,585	12,982
Feb.	6,825	5,658	6,895	3,736	5,120	5,431	17,090	16,075	14,650
Mar.	7,030	7,184	6,231	4,987	6,157	5,731	19,131	17,096	15,573
Apr.	6,554	7,373	6,661	5,051	6,359	5,702	20,674	17,801	16,638
May	6,149	6,737	7,168	6,304	6,140	6,300	21,141	18,389	17,702
June	6,171	6,306	6,953	6,898	6,832	7,136	20,243	17,858	17,159
July	5,729	5,284		8,569	7,070		17,267	16,004	
Aug.	7,424	6,480		9,579	7,983		15,462	14,664	
Sept.	7,590	5,651		7,762	6,758		15,312	13,511	
Oct.	6,208	5,065		5,474	5,024		15,929	13,539	
Nov.	4,852	4,775		4,045	4,723		16,604	13,585	
Dec.	5,277	4,969		5,463	4,712		16,200	13,692	

(1) Rubber Association of America figures, raised to 100%. The Association estimates its figures to be 75% representative or complete when issued and that basis has been accepted when preparing the statistics in this table.

(2) Held by manufacturers at end of period indicated.

Automobile Production

	United States			Canada			
	Total	Passenger Cars	Trucks	Total	Passenger Cars	Trucks	Grand Total
1921	1,595,304	1,452,902	142,402	66,246	61,098	5,148	1,661,550
1922	2,547,208	2,302,923	244,285	102,053	94,904	7,149	2,649,261
1923	4,020,255	3,631,728	388,527	146,438	129,228	17,210	4,166,693
1924	3,600,918	3,203,049	397,869	135,246	117,765	17,481	3,736,164
1925	4,265,704	3,760,459	505,245	161,389	139,311	22,078	4,427,093
1926	4,298,799	3,808,753	490,046	205,092	164,483	40,609	4,503,891
1927							
Jan.	238,926	199,650	39,276	15,376	11,745	3,631	254,302
Feb.	304,758	264,171	40,587	18,655	14,826	3,829	323,413
March	394,430	345,911	48,519	23,250	19,723	3,527	417,680
April	404,743	357,009	47,734	24,611	20,890	3,721	429,354
May	404,099	357,148	46,951	25,708	21,991	3,717	429,807
June	321,959	278,728	43,231	19,208	16,470	2,738	341,167
July	268,474	236,866	31,608	10,987	8,719	2,268	279,461
Aug.	308,807	274,378	34,429	12,526	10,139	2,387	321,333
Sept.	260,420	226,440	33,980	11,262	8,681	2,581	271,682
Oct.	219,712	183,041	36,671	7,791	6,236	1,555	227,503
Nov.	134,381	109,742	24,639	6,617	5,173	1,444	140,998
Dec.	133,178	105,784	27,394	3,435	2,277	1,158	136,613
TOTAL	3,393,887	2,938,868	453,019	179,426	146,870	32,556	3,573,313
1928							
Jan.	225,039	199,032	26,007	8,463	6,705	1,758	282,502
Feb.	323,368	290,830	32,358	12,504	10,315	2,189	335,872
March	412,825	371,408	41,417	9,724	7,478	2,246	422,549
April	409,948	364,877	45,071	24,240	20,546	3,694	434,188
May	425,990	375,798	50,192	33,942	29,764	4,178	459,932
June	396,967	356,439	40,528	28,399	25,341	3,058	425,366
July	390,445	237,933	52,512				
Aug.							
Sept.							
Oct.							
Nov.							
Dec.							

Exports of Crude Rubber from Principal Producing Countries

(*Long Tons*)

	BRITISH MALAYA[1]								DUTCH EAST INDIES[2]						
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon[3]	India & Burma[4]	Sarawak[4]	British North Borneo[4]	Siam[4]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China[3]	Amazon Valley	All Other[4]	World Total[7]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,955
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	517,523
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1926:															
Apr.	23,727	10,565	13,162	3,766	590	679	374	293	4,226	4,598	6,285	410	2,318	1,529	38,230
May	31,231	10,604	20,627	3,944	691	927	410	279	4,440	5,358	8,737	502	1,353	1,464	48,732
June	30,624	11,764	18,860	4,208	452	779	512	275	4,444	6,125	10,614	549	1,213	1,279	49,310
July	28,824	15,280	13,544	4,422	938	911	498	439	4,618	5,612	13,112	1,521	1,565	1,148	48,328
Aug.	34,625	13,595	21,030	5,666	521	890	476	316	4,132	5,699	10,390	378	1,888	1,097	52,483
Sept.	35,913	13,972	21,941	6,015	651	888	689	457	4,065	6,568	11,391	681	2,156	822	56,324
Oct.	29,367	15,203	24,164	5,672	634	805	473	385	4,058	6,998	11,491	661	1,904	1,023	58,268
Nov.	34,302	12,201	22,101	4,228	1,110	685	547	285	3,988	5,816	9,422	718	1,911	1,259	52,070
Dec.	36,811	14,716	22,095	6,498	1,176	895	617	338	5,054	7,117	12,786	790	3,821	714	61,901
1927:															
Jan.	34,946	14,995	19,951	6,697	921	959	585	304	4,187	6,706	10,690	941	3,482	981	56,404
Feb.	27,528	11,697	15,831	3,571	1,469	552	445	360	4,078	6,526	10,535	675	2,104	1,098	47,244
Mar.	41,346	17,464	23,882	7,142	1,124	997	639	432	5,657	7,004	12,905	733	3,178	1,791	65,484
Apr.	29,041	13,069	15,972	3,349	723	984	452	526	4,666	5,531	10,197	557	2,451	1,520	46,928
May	31,393	15,491	15,902	3,124	760	786	415	348	5,430	5,529	13,410	586	2,460	1,207	49,957
June	32,607	14,706	17,901	3,348	856	1,100	539	409	4,818	5,518	9,109	772	889	1,731	46,990
July	23,947	12,697	11,250	4,018	827	859	544	333	4,771	6,142	11,566	519	1,757	1,113	43,699
Aug.	30,371	17,105	13,266	5,357	688	1,133	623	546	4,355	6,682	12,440	716	1,928	969	48,703
Sept.	29,835	12,095	17,740	4,911	479	645	566	498	3,635	5,957	9,853	497	2,072	1,213	48,066
Oct.	29,846	15,801	14,045	5,245	802	721	591	542	3,810	7,755	13,633	775	2,752	939	51,520
Nov.	28,277	19,860	8,417	4,464	1,277	1,241	591	600	4,127	6,587	14,395	683	2,369	1,627	46,378
Dec.	32,185	17,865	14,320	4,130	1,395	946	592	664	5,763	7,878	13,438	1,191	3,340	1,444	55,101
1928:															
Jan.	27,731	16,618	11,113	4,352	1,605	842	500*	525	4,851	7,988	11,360	720	2,273	1,025	47,154
Feb.	28,813	12,911	15,902	4,353	1,081	667	500*	536	4,052	6,757	8,635	723	1,612	1,276	46,094*
Mar.	27,813	10,508	17,305	3,460	775	645	500*	269	3,999	5,826	9,690	613	2,750	1,211	47,043*
Apr.	20,029	9,335	10,694	3,460	789	630	500*	258	3,993	5,040	5,538	518	1,014	1,323	33,757
May	26,403	10,350	16,053	3,125	654	842	500*	241	4,943	5,355	10,382	619	2,062	1,200*	45,976*
June	22,930	16,168	6,762	3,125	963	926	500*	451	5,419	5,863	13,623	902	1,399	1,200*	41,133*
July	30,405	13,383	17,022	4,798		905	500*	366				744	1,264		

(1) Mayalan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, and 2,439 in 1927. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons 1924, 6 tons 1925, 20 tons in 1926, and about ½ ton in 1927. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I" are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons 1924, 2,239 tons 1925, 44 tons in 1926, and 84 tons in 1927. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands. This figure includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. *Figure is provisional; final figure will be shown immediately it becomes available.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(*Long Tons*)

	United States*	United Kingdom	France (h)	Germany	Canada (ac)	Japan (ac)	Italy	Russia (ce)	Australia (ed)	Belgium (d)	Netherlands	Scandinavia (abedf)	Spain (g)	Czechoslovakia (abed)	World Total
1919	236,977	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	342,378
1920	248,762	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	370,641
1921	179,678	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,562
1922	296,267	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	-3,807	1,778	589	567	395,885
1923	300,372	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	408,018
1924	317,747	-11,550	30,446	22,727	14,299	19,571	9,764	2,346	3,124	2,688	-867	3,178	944	1,370	414,847
1925	381,815	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,939	875	3,149	1,155	1,558	516,493
1926	395,667	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	613,643
1926:															
April	33,416	8,275	4,121	1,781	1,615	1,868	865	402	505	71	93	335	130	193	53,670
May	28,705	6,773	2,519	1,848	1,239	1,010	705	200	468	186	241	225	60	192	44,371
June	23,795	5,894	2,196	1,655	1,188	1,465	1,070	983	636	269	215	303	123	103	39,895
July	34,266	6,768	2,352	2,202	1,552	1,447	800	132	702	295	480	292	121	115	51,524
August	26,081	7,327	2,457	2,110	1,888	1,284	796	655	1,275	303	594	336	90	151	45,347
September	35,675	8,843	1,774	2,029	1,355	1,922	819	472	1,241	283	429	317	91	138	55,388
October	28,110	8,082	3,376	2,423	1,865	2,396	645	585	1,004	301	2	360	100	121	49,370
November	37,673	9,247	2,719	3,007	1,548	3,380	832	568	916	194	-18	358	90	181	60,695
December	35,850	4,749	2,890	2,562	1,847	856	439	725	777	248	156	443	151	306	51,999
1927:															
January	41,815	10,192	3,284	2,481	1,936	1,227	672	803	929	296	192	316	139	100	64,382
February	25,886	7,692	3,263	3,103	2,620	1,902	601	907	460	502	152	336	146	210	47,780
March	32,752	9,049	2,050	3,475	3,760	1,578	852	784	780	454	86	385	137	127	56,269
April	44,627	7,875	2,310	2,393	1,509	2,181	781	1,972	762	448	58	230	177	218	65,541
May	33,736	2,896	2,006	3,380	2,519	1,084	918	887	694	626	-57	335	155	223	49,402
June	31,270	2,282	2,387	3,632	2,086	798	942	1,506	557	583	-17	243	164	183	46,616
July	35,719	1,116	2,384	2,899	2,104	1,505	1,007	415	900	429	66	227	177	236	49,184
August	31,001	3,463	2,795	3,119	2,013	1,970	1,274	386	650	604	-63	312	138	123	47,785
September	29,801	7,800	1,956	2,891	1,850	2,025	684	518	772	552	-33	451	155	272	49,694
October	27,671	5,888	3,479	4,202	1,790	1,966	1,021	1,075	908	465	156	401	153	363	49,538
November	36,123	1,687	3,661	4,209	1,916	1,575	1,167	1,312	836	749	298	474	246	317	54,570
December	28,082	309	4,696	3,108	2,302	2,710	1,462	1,453	1,242	784	-202	514	268	300	47,028
	398,483	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,492	636	4,224	2,055	2,672	627,785
1928:															
Jan.	37,120	1 921	1,764	2,485	2,290	1,361	760	995	802	589	52	261	335	376	51,111
Feb.	30,926	3,143	2,526	2,984	2,553	1,258	487	159	616	599	98	307	296	297	46,199
Mar.	36,970	3,179	1,902	3,521	2,929	1 707	763	1,468	918	816	95	351	497	398	55,574
April	35,686	—2,280	2,204	2,719	1,938	2,353	1,115	926	832	575	280	339	304	159	47,150
May	28,659	—5,323	3,210	2,944	2,180	2,306	1,095	744	655	746	209	485		213	
June	25,143	—3,031		2,968	2,632			710	348	743	133				

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—German, United Kingdom, and United States exports to Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. *United States imports of guayule are not included in this compilation; such imports amounted to 4,305 tons in 1926 and to 5,019 tons in 1927.

BOOK REVIEWS

COMMERCE YEARBOOK. 1928. Published by the U. S. Department of Commerce, Washington, D. C.

This official survey of United States commerce and industry is issued in two volumes, the first of which is now ready for distribution. All essential data on the economic progress of the country during the past year is presented in this volume. It includes a resume of general business conditions with a survey of important developments in connection with production, employment, domestic distribution and foreign trade. Special sections deal with production, prices, market conditions and foreign trade in specific industries, including the manufacture of rubber products. Studies of fuel and power, transportation, banking and other fields are also presented. The second volume of the Yearbook, dealing with foreign countries, will be ready for issue about September 1.

TWENTY-EIGHTH YEAR BOOK. 1928. Published by the Rubber Association of America, Inc. 64 pp.

This annual publication contains the complete membership list of the Rubber Association of America, the names of all officers, lists of committees and divisions, and a reprint of the charter, constitution and by-laws of the organization. It also includes the names of all officers and directors since the beginning of the Association in 1900.

YEAR BOOK OF THE AMERICAN SOCIETY FOR TESTING MATERIALS. 1928. 325 pp.

This 1928 annual comprises a list of standards and tentative standards formulated by this society. Also included are the charter and by-laws of the organization, a complete membership list, personnel of standing committees, and lists showing the geographical distribution of members. The volume will be ready for distribution on or about September 20.

United States Imports of Guayule Rubber and Related Gums

(All quantities in Long Tons)

	Guayule		Balata		Jelutong		Gutta Percha	
	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars
1919	1,430	760,690	727	937,038	8,332	2,213,964	2,900	1,068,698
1920	758	345,985	1,064	1,260,043	5,672	2,068,501	3,183	1,520,309
1921	58	26,945	814	1,077,859	1,745	351,893	985	333,564
1922	127	57,040	812	978,765	2,335	403,812	818	281,012
1923	1,155	542,227	700	898,524	4,565	853,308	912	375,167
1924	1,356	536,392	464	568,456	6,165	1,237,100	1,408	463,610
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	1,603	629,284
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	1,445	661,156
1927	5,018	2,674,957	582	447,246	7,785	2,448,657	1,494	728,172
1928:								
Jan.	432	242,339	27	24,218	588	183,705	150	86,702
Feb.	489	281,295	33	32,165	403	142,621	312	215,085
Mar.	575	365,927	32	26,460	829	388,616	115	57,833
Apr.	512	312,131	47	32,924	592	174,970	68	27,627
May	452	283,414	—	—	679	226,064	100	42,762
June	424	220,081	9	6,799	293	91,152	28	12,374
July	191	100.342	123	46,747	373	113,295	81	27,344

Reclaimed Rubber in the United States

(All Quantities in Long Tons—100% Basis)

		Consumption					Consumption		
Year	Production	Tons	% to Crude	Stocks*	Year	Production	Tons	% to Crude	Stocks*
1919	81,366	73,535	36.3	.....	1924	80,079	76,072	22.4	.....
1920	86,395	75,297	38.4	.....	1925	132,930	137,105	35.6	13,203
1921	36,725	41,351	24.1	.....	1926	180,582	164,500	45.9	23,218
1922	57,834	54,458	19.3	.....	1927	189.144	178,471	47.6	24,980
1923	74,766	69,534	22.7	.....					
1927:									
Jan.	16,526	12,374	39.3	25,903	July	15,488	13,842	47.4	26,599
Feb.	15,860	14,424	47.8	27,291	Aug.	15,109	15,836	47.3	25,157
Mar.	16,788	13,528	37.4	27,124	Sept.	14,392	14,790	54.3	23,429
Apr.	14,483	16,677	46.5	25,712	Oct.	16,127	17,292	64.5	22,176
May	16,159	15,754	46.1	26,419	Nov.	15,477	14,876	55.5	21,728
June	16,652	15,547	46.0	25,811	Dec.	16,083	13,431	52.7	24,980
1928:									
Jan.	14,862	18,134	52.7	21,941	July	17,278	17,173	45.9	17,305
Feb.	15,291	16,808	49.9	20,848	Aug.				
Mar.	17,069	18,619	52.2	19,558	Sept.				
Apr.	15,393	17,355	52.9	19,283	Oct.				
May	18,945	18,201	48.8	18,137	Nov.				
June	18,781	16,328	43.4	18,709	Dec.				

*Stocks on hand at the end of month or year. Exports of reclaimed rubber, not shown in this table, amounted to 8,540 tons in 1927.

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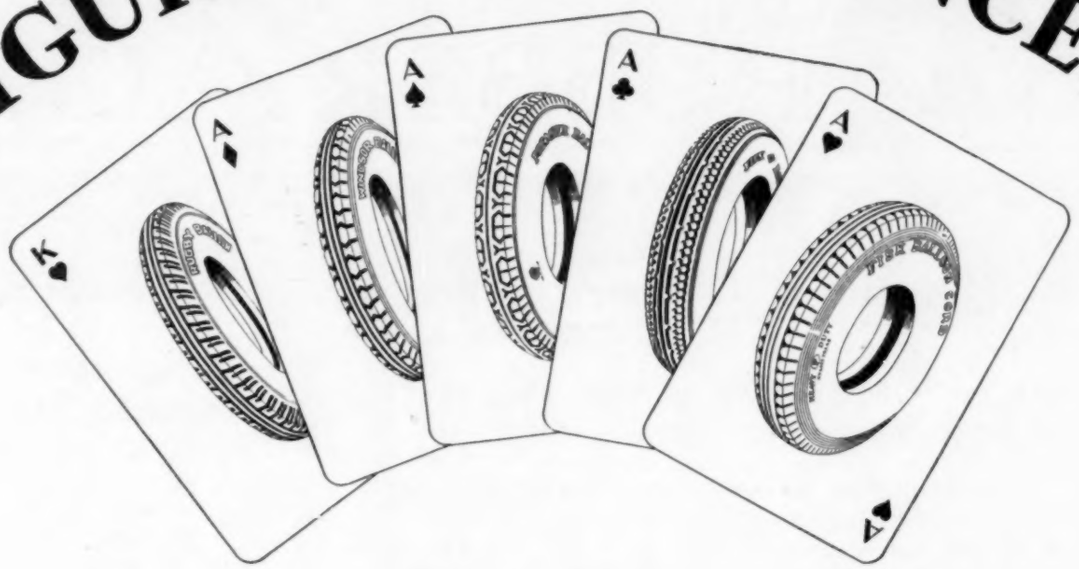

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